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ORGANIZATIONAL SETUP OF THE SOVIET AVIATION INDUSTRY

General

1. The position of Lt. General Mikhail Vasilevich Khrunichev, Soviet Minister for the Aviation Industry, was similar to that of the former German chief of technical air armament. This assumption was based on the observation that, in conversations with General Khrunichev, members of the air armament industry adhered to strict military discipline, while air force officers talked to him in an informal manner. General Khrunichev, a typical Party protege with limited technical knowledge, was directly subordinate to Marshal N. Bulganin, a reserved and realistic person with extensive aeronautical knowledge. The most important deputy assigned to General Khrunichev was Major General Makar Mikhailovich Lukin, a former chief constructor at an aircraft engine plant who was in charge of the mass production of aircraft engines and of the deported German engineers. General Lukin was also responsible for particularly important projects such as the EF-150. Massalov (fnu) held the influential position of a chief secretary of General Lukin. Deputy Minister for the Aviation Industry Professor Major General Sergey Nikolayevich Shishkin

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was chief of the Scientific Department at the Ministry.[1] Professor Shishkin was simultaneously chief of the TsAGI Institute, which was subordinate to the Scientific Department. The branch institute for practical flight tests, designated "Letnyy Ispytatelnyy Institut" or LII, was also subordinate to Professor Shishkin.[2] The TsAGI Institute was located near Stakhanovo - Zhukovskiy (55-33N, 38-08E) airfield, which housed the LII Institute. This airfield, also referred to by the names LII or Ramenskoye, was the official test field of the Ministry for Aviation Industry. The TsIAM Institute (Central Aero - Engine Institute) for aircraft engines was probably directly assigned to General Lukin. Opytnyy Zavod No 1, the experimental plant for airframes in Podberezhe (56-45N, 37-09E), was subordinate to Department 7 of the Ministry. Gulei (fnu), chief of Department 7, was later replaced by N. N. Vlassov. [redacted] 25X1
25X1 [redacted], Department 7 was the intelligence section. The VIAM Institute engaged in research in lubrications, hydraulic oils, and probably also of fuels. The Batchta Laboratory, named after its chief, Professor Batchta (fnu),[36] was assigned to the Ministry for the Aviation Industry. This institute was engaged in the copying and construction of hydraulic systems and hydraulic pumps, fuel pumps, and fuel governors. The instruments constructed by this institute were mass-produced in a plant in Moscow.[3]

The TsAGI Institute (Central Aero - Hydrodynamics Institute)

2. The major projects assigned to the TsAGI Institute included:

a. Basic research, which was partially based on information obtained by espionage and from foreign technical literature.

b. The designing of high speed profiles on the basis of a calculation system established by Professor Shishkin. (For project EF-150, for instance, only profiles of the TsAGI Institute were to be used instead of international standard profiles.)

c. Wind tunnel experiments. There was one tunnel for speeds up to 240 km/h for actual size aircraft models and one or two high speed wind tunnels available at the institute. Aircraft projects forwarded to the institute were analyzed and breaking point tests were performed. Construction directives and testing terms were worked out at TsAGI and were published in 1949 as Construction Directives for the Aircraft Industry of the Red (sic) Air Fleet. TsAGI Institute also either recommended or advised against mass production of individual types of aircraft. The institute had about 1,000 employees. Its equipment included the former Heinkel test stand for ejector seats and a measuring stand for acceleration, which was converted so that it could be driven by its own engine in 1947. Professor Guenther Bock, formerly the leading expert in the field of aerodynamics of the DVL (Deutsche Versuchsanstalt fuer Luftfahrt), worked on calculations of Mach numbers and on the recalculation of profiles for TsAGI in 1947 and 1948.[4]

LII Institute

3. Major General Petrov (fnu) was the commander in charge of the LII test airfield and the Institute. Professor Ostaslavskiy (fnu), a former assistant of Zhukovskiy, was scientific chief of LII. Repkov (fnu) was chief pilot, but was arrested and replaced by Sossim (fnu).

Opytnyy Zavod No 1

4. a. Opytnyy Zavod No 1 was located in the former plant area of Zavod No. 30. Organized like an average Soviet plant, it represented an experiment in an independent development plant. Other development plants were intended to be established on the same system. The leading directors in

order of importance were Major General Abramov (fnu), Chief Engineer Sergey Sergeyevich Rebenko, Alekseyev (fnu), and Vasil Vasilevich Smirnov. The first director was superior to the chief engineer of the designing and construction offices; to the chief engineer in charge of the production department; to the chief technician for calculations; to the chief engineer for power supply, heating, etc.; and to the chief of the procurement department.

b. The business manager, P.P. Smirnov, was not identical with director Smirnov. He was subordinate to the plant director; however, with regard to basic financial problems, he was directly responsible to the Finance Minister.

c. Department 17, the flight test section of OPN 1, was directly subordinate to the Minister of the Aviation Industry; the chief of this department and the chief pilot were permitted to report directly to the Minister.[5]

d. The technical control section, Otdel Tekhnicheskogo Kontrolya (OTK), was comparable to the Bauaufsicht Luft (BAL) (Supervision Department for the Construction of Aircraft). This governmental control section at the plant was subordinate to the testing department of the Ministry for Aviation Industry.

e. From 1946 to September 1950 Graduate Engineer Brunlof Charley (Wilhelm) Baade was the chief engineer of OKB I, and Engineer Hans-Heinz Roessing was chief engineer of OKB II. The chief engineers were permitted to report directly to Minister Khrunichev and also to the Kremlin. Baade frequently reported to or was consulted by the Kremlin.[6] OKB I was composed of personnel from the Junkers Plant, while OKB II included personnel from the Siebel and Heinkel Plants and a composite chemical and rocket department. Fedor Pavlovich Voznesenskiy was chief Soviet engineer.

f. OPN No 1 had a work force of about 600 German experts and about 3,500 Soviets. This number included the work force of the collective farms. The German group with dependents included about 1,500 persons. Although it was planned that Soviet experts should gradually replace their German colleagues, this was accomplished only in the production department, where the Soviets were assigned to the positions of section chiefs, while the designing departments remained under German management, although there were Soviet deputies assigned to every department. [redacted] doubted that the Soviets would be able to compete with the German engineers and carry on their construction activities without German assistance. 25X1

<u>Development Methods</u>

5. The leading Soviet chief engineers had their own design and construction offices. Most of them were located in or near Moscow. The designers Mikoyan, Ilyushin, and Lavochkin had their offices northeast of Leningrad Street in the vicinity of the central airfield. Gurevich had worked since 1949 or 1950 at OPN 1 in the special field of wing construction with air suction devices (Absaugfluegel).[7]

6. Orders for the construction of new types of aircraft were given by the Ministry for Aviation Industry. The directives for the design and construction were more strictly outlined than in the former German air industry. The various chief engineers forwarded their design plans, models, or model parts to TsAGI for inspection and, if required, for modification. TsAGI then returned the plans to the designers, and one or two construction models and structural parts for breaking point tests were built. These breaking point tests were again performed by the TsAGI Institute. Aircraft prototypes were first test flown by test pilots who were assigned to the designers; the aircraft were then forwarded to LII for further tests. After the major modifications were

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accomplished on the model, a commission composed of the representatives from the TsAGI Institute, the chief engineers, and representatives of the highest Soviet authorities decided whether or not to place this type into mass production. The professional rivalry between the designers and TsAGI was intensive. The Ilyushin team even attempted sabotage on the EF-140 by sawing at the rudder control shafts, when, in 1948, the EF-131 performed better test flights than the four-jet Ilyushin bomber.[8]

ACTIVITIES AT OKB I

Research Equipment

7. The complete equipment from the Dessau Junkers Plant was available at OKB 1. This equipment included a wind tunnel for speeds up to about Mach No 0.9, which was previously driven with steam and was now powered by one Jumo-004 engine. A library was also available. Furthermore, the experimental plant was furnished specifications sheets available from TsAGI and mock-up models of the instruments to be installed. Most of the Soviet technical literature was outdated.

Various Types of Aircraft

8. Aircraft of the type Me-263, which was the last type mass produced at the Dessau Junkers Plant during 1944 and 1945, were not developed further at OKB I. However, [redacted] an aircraft powered with a Salbei (concentrated nitric acid) (HNO_3) fueled engine in June and July 1947. This aircraft seemed to have been manufactured in mass production. Three aircraft models of the type EF-126 were brought from Germany to the USSR and were being fitted with a newly constructed pulse jet unit with a thrust of 600 to 800 kg and a life endurance of five hours for the flap valve unit and of 15 hours for the tube. The maximum altitude of the EF-126 was about 4,000 meters. Ludwig Hoffmann was to pilot the aircraft during the test flights, but the project was given up because of the lack of funds.[9] German fighters of the type EF-137 were of no interest to the Soviets and were not further developed in the USSR.[33] A Ju-88 which was brought to the USSR for testing purposes was renamed EF-145. After a crash landing, the aircraft was salvaged. The EF-155 is the Soviet copy of a British Meteor aircraft powered by original Derwent engines. This rather poor construction failed during the flight tests and was forwarded to OKB I as a test plane for experiments with tandem landing gear for the EF-150. There is no information available on the EF-132, which was probably worked on at various places. [redacted] a dummy model of this type which was designed for a range of 5,000 km. The wings were swept-back in the first third, swept-forward in the second third, and straight in the outer third. Five different profiles were designed for the wings. [redacted] this aircraft was "an insane idea created during the postwar confusion".[10] Ju-287 was the designation for a model constructed in 1944 and 1945. The aircraft had wings with a sweep back of 24 degrees, a He-177 type fuselage, the cockpit of the Ju-188, and a rudder assembly of the Ju-388. The aircraft was salvaged.

Aircraft of the Type EF-131 (P-131)

9. There were three experimental models constructed of the type EF-131, of which test model No 2 was intended for breaking point tests. Construction model No 1 was sent to Ramenskoye airfield on 5 May 1947, where it was test flown until October 1947, and then forwarded to Teplyy Stan for further test flights. Later, test model No 1 was converted to the EF-140 B, and test model No 3 was remodeled to an EF-140. The long range reconnaissance version of the EF-140 was designated EF-140 R.

10. Following are the technical specifications on construction model No 1 of the EF-131:[11]
    a. Power plant: six Jumo-004s with 880 kgp each.
    b. Wing length: 19.6 meters
    c. Wing area: 54.2 sqm
    d. Wing span: about 21 meters
    e. Wing load area: 450 or 521 kg/sqm
    f. Net weight: about 15,200 kg
    g. Nose wheel load: 1,800 kg
    h. Maximum fuel load: 9,800 liters
    i. Maximum bomb load: 2,400 kg
    j. Standard flying weight: 24,800 kg
    k. Service ceiling: 12,000 m
    l. Maximum flying weight with rocket-assisted take-off: 27,200 kg
    m. Maximum speed at a flying weight of about 17,500 kg at an altitude of 8,000 meters: 864 km/h
    n. Theoretical range with full tanks and a 2,400 kg bomb load: 2,400 km[12]
    o. Take-off speed at a weight of 19,500 kg: about 262 km/h
    p. Landing speed at a weight of about 15,400 kg: 212 km/h
    q. The theoretical location of the center of gravity was calculated at 20 to 28 percent; test flights revealed it at 16 to 29 percent.[13]
    r. The wings were swept forward at an angle of 28 degrees and had a dihedral angle of eight degrees.
    s. The landing gear was designed for a maximum speed of descent of 5.9 m/sec. These design data were obtained according to a new calculating system which was probably based on the American system.

All versions of the EF-131 and EF-140 were to be equipped with powder-fueled Rato units at the fuselage. The units were not installed yet. A so-called fuel jettisoning device emptied the fuel tanks within about nine minutes. Once, it almost caused a crash landing when an engine failed. The tail gun position, equipped with two German 20 mm guns, was remote-controlled by means of a periscope. The instruments were of German origin and included bombing equipment with German instruments and German bomb shackles. The three-axis directional control devices were copies of the American auto-pilots which, for the lack of individual parts, were not yet operational.

<u>Experimental Model No 1 of the EF-140 and the EF-140 R Model</u>

11. The Soviets requested the construction of the EF-140, its models, and of the EF-150, with the projected basic layout but with improved speed and range.[14] This request, having the character of a military order, had to be carried out under any circumstances and, since the technical basis for these improvements was not given, the requested performance specifications were achieved by means of "mathematical tricks" (sic). These orders were extremely difficult to carry out, as the Soviets frequently changed the data of the engines to be installed in these aircraft. The specifications given in this report were, as far as possible, thoroughly checked. Test flights with the aircraft started in June 1948, and on 5 March 1949 the Soviets took over the aircraft.

12. The EF-140 deviated from construction model No 3 of the EF-131 with regard to the engines, the armament, the reinforced landing gear, and the slightly decreased net weight. It was powered by two AMTKRD-2 (A.Mikulin Turbo-Kompressornyy Reaktivnyy Dvigatel) engines with a thrust of 2,800 kg each, which were also referred to by the designation M-2. The dimensions were to be the same as the ones of test model No 1 of the EF-131. A crew of four—the pilot, the observer, the radio operator and aerial gunner, and the mechanic and aerial gunner—were stationed in a pressurized cabin. The projected data included the following:

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a. Maximum flying weight with Rato units: 27,100 kg
b. Maximum bomb load: 2,400 kg
c. Dimensions of the bomb bay: 4.8 m long, 1.7 m wide, and 0.95 m high

The bombs were to be suspended horizontally. The bomb load could be replaced by a 4,800-liter load of fuel which was to be carried in jettisonable tanks. The standard fuel tanks, with a capacity of 9,200 liters, were installed above the bomb bay. The 140-R version was equipped with two wing tip tanks, each with a capacity of 1,400 liters, in addition to the standard fuel containers and the jettisonable tanks in the bomb bay. It was requested that the EF-140 have a range of 2,400 km with bomb load and a range of 3,600 km with fuel tanks instead of bombs in the bomb bay. A thorough check of these performance data revealed that the EF-140R would have a range of 3,000 km to 3,080 km, including a reserve for a scramble take-off. The performance data of the EF-140 were correspondingly lower. The following listed maximum speeds were achieved during test flights with a flying weight of about 17,000 kg:

km/h	Altitude	International Mach No.	Soviet Mach No.	Remarks
895	7.8 km	0.798	0.82	
905	7.6 km	0.819	0.84	
920	7.8 km	0.821	0.846	flown at a temperature of 52° C below zero.

The landing distance at a coefficient of friction of μ 0.04 was 1,800 meters without brakes and parachute; at μ 0.16 with parachute it was 1,400 meters, and at μ 0.2 with a brake power of 40 percent and parachute it was 480 meters. The armament included two turrets, each with two Soviet 23 mm guns. The turret behind the cockpit traversed about 275 degrees, and its guns could search about 80 degrees upward. The other turret below the fuselage aft of the bomb bay traversed about 360 degrees, and the guns could search from 74 to 80 degrees. The aiming device was a Zeiss-made periscope. The electro-hydraulic control devices were designed after German models, while the turrets were copied from American designs. The periscope had no computers. Tracer ammunition was fired.[15] A dummy of the Norden type bomb sight was installed. No radar equipment was planned for the aircraft. The air-to-ground interphone was a Soviet duplication of an American model. Two jettisonable Rato units were to be attached to either side of the rear of the fuselage.

Specifications of the AMTKRD-2 (M-2)

13. The M-2 was similar in shape to the Jumo-012, but shorter and somewhat larger in diameter.[16] The jet engine was designed with an eight-stage axial flow compressor with a compression ratio of 1 to 4.4 and a single-stage turbine. The fourth compressor stage was fitted with an additional valve. The governor used with the unit was copied from the Jumo-004 and, as was suggested by the German experts, remodeled by the Batchta Institute. Difficulties arising with the governor at speeds between 5,000 rpm and 6,200 rpm were herewith eliminated. The fuel consumption was 1.2 kg per kgp/h. The following output data of the M-2 were recorded in test flights with the engine:

RPM	Turbine Temperature	Oil Pressure in Atmospheres	Thrust, Obtained Theoretically
6,200	700 degrees C	7.5	2,800 kgp
6,050	620 degrees C	6.5 to 6.8	2,500 kgp
4,500	450 degrees C	4.5 to 4.7	800 kgp
2,400	580 degrees C	2.5	180 kg idling thrust

The maximum idling speed for the engine was 4,200 rpm at flying altitude and 2,400 rpm at sea level.

14. The M-2 was started by a compressed air ground starting device. A small container for compressed air was installed in the cabin. This starter system was only temporarily used for the tests. [redacted] 25X1 electric starters, developed on the basis of US models, were to be used in Soviet Air Force units with the turbojet power plants. The M-2 was to be started as follows:

a. Open the air pressure valve to fill the container in the cabin with compressed air.

b. Open the compressed air reduction valve; the pneumatic starter unit is operating.

c. Switch on the ignition with the engine turning at 400 rpm until the rpm are accelerated (sic).

d. Shift the throttle lever from "stop" to "idling speed, ground" and accelerate to 2,400 rpm. The gas temperature forward of the turbine is not to exceed 820 degrees C. Temperatures up to 900 degrees C would not harm the turbine, according to the Soviets. At this stage, the oil pressure is about 2.5 atmospheres.

e. Open the safety cock.

f. Shift the throttle lever slowly to "idling speed, air", while the temperature is to drop from 540 degrees to 480 degrees C, and the engine is to run at 4,500 ± 50 rpm at an oil pressure of 4.5 atmospheres.

g. Have the engine dry out (warm up) for a period of 30 seconds.

h. Pull the throttle to full power and accelerate speedily up to 5,200 rpm, with the gas temperature being 560 degrees C and the oil pressure 6 to 6.5 atmospheres.

i. Pull the throttle to full power (sic), accelerating the speed about an additional 2,400 rpm. The standard period required for this acceleration is 12 seconds.

The gas temperatures and the temperatures forward of the turbine correspond to the German "T_3" temperature terms. The M-2 engine was tested in flights with experimental model No 1 of the EF-140. After preliminary difficulties were eliminated, the engine operated satisfactorily. The last engine to be tested had a plate indicating that the unit would need a check after 15 hours of operation and an overhauling after 50 hours of operation. The life endurance of the engines was designed for 150 hours. During the first period, the compressor frequently operated irregularly.

<u>EF-140 B (P-140 B)</u>

15. The EF-140 B was developed on the basis of test model No 1 of the EF-131. The aircraft was powered with two Soviet duplications of the Nene engine. The cabin was designed in a form which was later also given to the cabin of the EF-150. All other dimensions and data were those of the basic EF-131. The standard fuel capacity was 9,200 liters. The bomb bay was to hold either a 2,400 kg load of bombs or 4,800 liters of fuel. The theoretical range for the bomber version of the EF-140 was calculated at 2,000 km, which would correspond to the actual performance of the aircraft. The redesigning was finished in the summer of 1950, and by September 1950, the

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aircraft was ready for transportation to the Borki testing field.

General Information on the EF-140

16. With the EF-131 and the EF-140, the new versions of the Ju-287, all difficulties anticipated in flight performance were eliminated. High speed tests revealed the excellent effect of the swept-back wings. The manufacture of spars met with difficulties. The German plant suitable for this production was allegedly dismantled and shipped to the USSR, and rumors indicated that the Soviets had failed to reconstruct the plant or to find the production methods for spars. [redacted] 25X1
25X1 [redacted] the EF-140 was being mass produced in Stalingrad and in a plant located east of Stalingrad.

EF-150 (P-150)

17. The EF-150 was designed between 1948 and mid-1949. General Lukin personally urged the construction of the first two test models, which was started by the end of 1949. The German work force at the plant "unanimously" determined to work 12 to 16 hours per day. It was believed that the EF-150 was to be mass produced, as B.C. Baade frequently had meetings with leading Soviets, including Marshal N. Bulganin. By September 1950 the first test model was 60 to 70 percent complete. There are no details available about the second test model constructed for breaking point tests. Conferences on the construction of the third test model were not completed by September 1950. Unlike the EF-140, the EF-150 was constructed in accordance to the standard Soviet system from the very beginning.

18. Since the technical specifications of the EF-150 were still being discussed in September 1950, they cannot be considered final. The most important specifications included the following: The engines were to be two Mikulin turbojet engines, each with a thrust of 4,500 kg or two Lyulka (Lyulkov) turbojet engines, each with a thrust of 5,200 kg. The Lyulka engines had an estimated fuel consumption of 1.18 kg/kgp/h. It was not known which of the engines would be available. According to rumors, the engines were being constructed in Moscow. Installation models indicated that the EF-150 would be equipped with single turbojet units, rather than with two twin turbojet engines.[17] The cabin for a crew of four and the tail gunner's station were pressurized. The aircraft was about 28 meters long, had a wing span of about 30 meters, and a height of 8 to 8.5 meters.[18] The wing area was about 128 sqm with a wing load of about 435 kg/sqm. The bomb load capacity was not determined. One of the versions, [redacted] the bomber or the re- 25X1
connaissance version, was to take 36,000 liters of fuel. The take-off weight was about 56,000 kg. The maximum speed was given as 1,050 km/h. The German engineers, however, estimated that only 950 km/h to approximately 1,000 km/h could actually be achieved. The service ceiling was given as 12,000 meters for the Mikulin engines and as about 14,500 meters for the Lyulka engines. The Soviets requested a maximum range of 3,600 kilometers for the bomber version and a range of 5,400 kilometers for the reconnaissance version at a flying time of five and a half hours. Even with the Soviet flying method, i.e., the aircraft climbs gradually in accordance with the decrease of flying weight, and performs a spot landing with idling speed from an altitude of 12,000 meters, these ranges could not be achieved practically or theoretically. The actual range of the reconnaissance aircraft in individual flights under favorable conditions was calculated to be 4,500 km with a flying time of about five hours. Another version of the EF-150 was designed as a fast auxiliary passenger plane.

19. Essential construction specifications of the EF-150 included the following:

a. The monocoque wings with corrugated metal reinforcements of the outer skin were constructed on the basis of American design. Hot air for the

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deicing of the leading edges was to be led from the compressor by means of a tube. The problem of deicing the rudder assembly was still being discussed. The outer skin of the fuselage was of duraluminum four millimeters thick and was supported by four longerons. The densely riveted upper section of the fuselage was designed as a torque tube and was to be utilized as fuel tank. Two lines of rivets fastened the outer skin to the bulkheads in the tank and to the longerons. This design caused objections, expecially as it was feared that the tanks would leak after the aircraft was in air force operational units for some time. As a protection against leakage, the tank was eventually to be provided with rubber bags. The Soviets approved this design because of the material saved. To protect the fuel tank against bullets, it was subdivided by bulkheads and fitted with many vertical light metal tubes, about 8 cm in diameter and about 0.4 mm thick, standing side by side. These tubes were fitted with non-return valves at the bottom. Firing tests with explosive ammunition revealed that, even though many tubes were damaged, not much fuel was lost. Steel core ammunition, however, caused a higher loss of fuel, because of the fact that the impact was stronger. The tank could be emptied only by numerous bullet holes in the sides. The fuel between the tubes was lost in all tests, while only the fuel above the bullet holes ran out from inside the tubes. The non-return valves never failed in any of the experiments.

b. The bomb bay was about 6.5 meters long. The bomb doors were retracted like venetian blinds into the sides of the fuselage. A horizontal bomb suspension was probably intended for the aircraft.

c. The stick control system was copied from the FW-190. Transmission was by hydraulic servo control with built-in feel.[18] A German system was used for the electro-hydraulic operation of the landing gear and the landing flaps and for the adjustment of the horizontal stabilizer. As with the EF-131 and the EF-140, this system could be substituted in emergency cases by a manually operated pump for the landing gear and the landing flaps and by an additional electric generator. Kerosene could be pumped into the hydraulic system to replace lost hydraulic oil.

d. The ejector seats were to be jettisoned upward with a speed of 18 G by powder rockets. However, as the Soviets were incapable of constructing powder-fueled rockets with a small operational tolerance, the ejecting speed had to be set at 16 G, which did not guarantee that the crew would get away from the rudder assembly. The bombardier was jettisoned downward with a speed of 3.5 G.

e. The cabin was protected at the rear by an armored bulkhead, the floor was provided with a splinterproof protection of 10 mm duraluminum, and the seats of the pilot and of the radio operator were fitted with armor against fire from 105 degrees to 255 degrees in flight direction. The cabin was to be heated by a new heating system developed at OKB 1. If this system should fail, the crew was to be warmed by electric heating combinations which were to be fed from the 24-volt power system. [redacted] 25X1
25X1 [redacted] one model of these heating combinations which was very similar to the ones used in Germany.

f. The armament included one turret behind the cabin with two 23 mm guns, a tail gun position with the same armament, and two 23 mm guns in the nose. The extendable tower aft of the cabin was constructed on the basis of American design. The guns were of Soviet origin, and the aiming device was a Zeiss-made periscope with crossed threads without a calculating machine. Transmission was by an electro-hydraulic system. The tail guns were directly operated by the gunner, who sat on a elevated seat over the guns. In order to bail out, he had to open the hatch,

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which lowered and tilted the seat automatically. The rotable aiming device for the nose guns was above the instrument board and included a reflector sight with cross hairs.

g. The air-ground interphone was a Soviet copy of an American model. The dummy of the faired rotary antenna of the all-around search apparatus was fitted under the fuselage forward of the front landing gear. The dummy of the apparatus was installed between the pilot's seat and the radio operator's seat. [redacted]
25X1 25X1 [redacted] the aircraft was equipped with a radio compass.

h. During the take-off performance, the rear unit of the tandem landing gear was slightly retracted at a speed of 150 to 180 km/h, so as to enlarge the angle of incidence about 1.8 degree. The front wheels of the landing gear were synchronized with the operation of the rudder control at a ratio three to one. Thus, the aircraft could easily be taxied in spite of the tandem landing gear.

i. Two jettisonable Rato units were to be attached to both sides of the rear fuselage. Details were not available.

j. Dive brakes were still being discussed, but [redacted] they 25X1
would be installed in the aircraft.

k. At first, original Liberator tires were used on the aircraft. Later those tires were reproduced in a Yaroslavl plant. Tests with the EF-140 revealed that the quality of the new tires was about 60 percent below the quality of the originals.

l. Most of the instruments were Soviet copies of German models. They were mass produced in the USSR. The three-dimensional autopilots and the landing direction indicator were developed from American originals. The oxygen apparatus with masks and the O_2 automatic controller, radio helmet, and the throat type microphone were German models in mass production in the USSR. The signal equipment was copied from American models.

Fire Extinguisher

20. A new type of fire extinguisher was being developed by a group of experts under Boris von Schlippe.[19] With a propellant powder charge acting as catalyzer, carbon tetrachloride was to be heated and forced with high velocity into the fire, blowing out the flames. This device was designed for the engines and fuel tanks of the EF-150.

V-1 Missile

21. Between the fall of 1949 and the summer of 1950 an experimental series of 25 V-1 missiles powered by two 180 kgp pulse jet units were being constructed at OPN 1. As the Leningrad plant, originally charged with this project, had allegedly failed, OPN 1 was assigned the construction of the experimental missiles. The V-1 was equipped with a pre-set automatic flight control, but certain installations indicated that remote control was also planned for the missile. Further information was not available.[20]

Helicopter

22. A small single-seat helicopter constructed at a plant in Leningrad was reassembled at OPN 1 during the summer of 1950. No details could be obtained.

Fuels

23. Kerosene with a specific weight of 0.86 was the standard fuel used with the turbojet power plants. Tests under cold temperatures revealed that at a temperature of -47 degrees C the kerosene turned cloudy and that saponification started at a temperature of 54 degrees C below zero. This indicated a sufficient degree of purity. The hydraulic oil, MVP-60, was a Soviet post-war development. In quality it was below the German hydraulic oils, but it was considerably improved during the period reported on.

Materials

24. The duraluminum used at the plant was designated D 16 T. The T was said to be the nomenclature for the plating. There was a bottleneck in the supply of light metal alloys of high stability. Even though there was a sufficient quantity of duraluminum plates measuring 1 x 2 meters, at thicknesses of 0.8 mm, 1 mm, 1.4 mm, 1.6 mm, and 4 mm, a definite cutting was ordered. [redacted] 25X1 25X1 German engineers were requested to produce metal plated plywood. Steels of the Soviet types Kh G S A 30 and Kh G S A 40 (ХГСА or ХГ3 А) were available. Because these steels were very hard but also very brittle, they were not as well suited for aircraft construction as the less rigid German steels. Other sorts of steel could not be supplied, even though it was continuously requested by the German scientists. Steel was also under strict economic controls.[21] There was also a shortage of bronze alloys. Therefore, bronze was frequently collected by Komsomol members. The supply of ball bearings was sufficient. They were allegedly manufactured in Moscow. Compared with German-made ball bearings, the tolerances were unbelievably high; furthermore, most of the balls were not evenly round. The quality of the bearings was not improved during the period reported on. Copper wire with rubber insulation and textile fabric cover was used for the cabling of the aircraft. It filled the requirements set by an obsolete US standard. Plexiglass, too, seemed to be a bottleneck. As the supply of new Soviet plexiglass was insufficient, old German stocks had to be repressed. [redacted] an engineer of the 25X1 Mikulin experimental team that experiments for the production of ceramic turbine blades were still being continued in the Soviet Zone of Germany in July 1950.[22]

OBSERVATIONS ON AIRFIELDS

25X1 [redacted]

LII Airfield near Ramenskoye

25X1

25. The airfield [redacted] between 1946 and the fall of 1947. It had two concrete runways which crossed. The TsAGI Institute was located about two kilometers northwest of the airfield. The LII Institute was housed in a former tuberculosis sanatorium at the northeastern border of the field.[23] The airfield installations included two radar sets, one of which was probably a Dumbo set, the other one being an American lend-lease radar set on several big trucks.

26. There were about 300 aircraft stationed at the field. [redacted] 25X1 25X1 25X1 MIG-15s were observed for the first time in June 1947. The unit stationed at Teplyy Stan airfield was re-equipped with jet aircraft by March 1949, and by mid-1949 all fighter units in the Moscow area were obviously re-equipped with MIG-15s, since this was almost the only type of fighter aircraft observed. The first Tu-10 was observed during February 1947. The Tu-10 was similar to the Tu-9 and was a version of the conventional Tu-2, but was powered by two turbojet engines under the wings

and one Nene jet engine in the fuselage. The Nene engine was installed in a
slanting position with the air intake opening in the upper section of the
fuselage, and the exhaust was under the fuselage at the place of the ventral
gun position. This type proved unusable, and the development was cancelled.
Main reason for this was the fact that the Nene, which was projected as an
auxiliary booster engine, could not be started during the flight. A four-
engine Ilyushin bomber, similar to the Type 10, and powered by four Jumo-004
turbojet engines fitted close to the underside of the wings, was also un-
usable because the bending fatigue resistance of the fuselage ceased at a
speed of about 720 km/h. This project was given up in the fall of 1947. There
were other versions of four-jet Ilyushin bombers with the engines carried by
pylons and other types of engine mountings. Two Soviet duplications of the
Me-262 were subjected to test flights during 1947. Because of insufficient
flying characteristics this type was not placed into mass production. The
first Tu-4s with double-row radial engines, each fitted with two superchargers,
were observed during May 1947. [redacted] the airframe was a true 25X1
copy of the American B-29. Later it was learned that the production was
cancelled after about 600 aircraft were completed, because of frequent cases
of damage to the gears (sic).[35] Only 60 to 80 aircraft of the type Tu-70
were allegedly constructed. Type 7, identified as Il-17 [redacted] was 25X1
flown until unserviceable and then not developed further. MIG-9s, powered
by two Jumo-004 engines and fitted with a nose wheel, and Yak-15s, powered
by one Jumo-004 and fitted with a tail wheel, were observed at the field.
25X1 [redacted] Type 16 aircraft were designated La-16. There were also
two-seater versions of Type 16 which were allegedly being mass produced in
Tbilisi. Type 4 was said to be a MIG model which was test flown but was not
placed into large-scale production. There were two Type 5 aircraft available.
This aircraft, too, was allegedly not being mass produced. There were two or
three aircraft of the type designated "23 August 1947" stationed at the field.
These aircraft were used for various experimental purposes. Aircraft of the
US designation Type 15 were identified as La-17s [redacted] They were not 25X1
being mass produced. In 1947 and in 1948, test flights were performed with the
Omega helicopter. There were three DFS-346 type aircraft at the field. The
DFS-346s were parallel developments to the ones worked on by German scien-
tists at OKB 2 of Zavod No 1. These aircraft were powered by one Walther
engine. The pilot flew in a sitting position. The aircraft were flown until
they were unserviceable. Type 23, an aircraft larger than the FW-189, was
remodeled and several versions existed. It was stated that this aircraft,
powered by two small double-row radial engines with superchargers, should
have reached an altitude of 13,000 meters. There was a cargo glider for
about 16 men stationed at LII airfield. The glider was a high-wing mono-
plane with a small tricycle landing gear under the fuselage, very similar to
the Cybin model. At a later date, [redacted] two of these cargo gliders 25X1
at an airfield near Dmitrov.[24] The Yak-9 was being tested for service as a
rocket carrier having six rockets, 60 cm long and about eight cm in dia-
meter, mounted under the wings. Several dropable units were observed be-
tween October 1946 and October 1947. [redacted] the remote con- 25X1
trolled bomb Fritz X which was being tested in air-to-ground launching and
control experiments. Various drop glide models with Mach No. gauge and
straight or swept back wings were used for experiments in supersonic regions.
During the period reported on, these experimental units had no power plants
and were merely dropped. [redacted] 25X1
25X1 [redacted] One of the drop glide models was painted
red and resembled very much a fighter aircraft. [redacted] 25X1
25X1 [redacted] pulse jet engines and the Jumo-003
were test flown with the Tu-2. Several conventional planes were observed
carrying aerodynamic measuring devices as wing parts and parts of rudder
25X1 assemblies, etc. [redacted] the TsAGI Institute for breaking point tests
25X1 with the EF-140 and [redacted] a German remote-controlled missile with a com-
puter in one of the rooms. [redacted] V-1 missiles and 25X1
non-serviceable parts of V-1s were observed at the salvage dump.

25X1 25X1 27. [redacted] at the airfield of LII and with the unit stationed at Teplyy Stan, [redacted] Soviet aircraft were equipped with the following records. Each aircraft had a log book, similar to those used in Germany at the beginning of the war. This log book was kept in the flight administration building and was carried by aircraft only for long range flights. For each flight special forms were filled out, containing all details of the order on the front side and the pilot's report on the accomplishment of the mission on the other side. The pilot's report included exact details on the engine power used during the flight, broken down into idling speed, full power, and cruising power. These data were entered by the flight administration in the log book. Every evening after each flight, respectively, the chief engineer or the chief technician of the unit checked the performance data and entered them with any repairs or overhauling in the life record of the aircraft, which was kept separately for the airframe and the engine. These live records were also being kept by the flight administration. 25X1 [redacted] similar files were being kept for the armament and for the instruments.

28. During 1947 and 1948 flight navigation was still in a very low status of development. There were QDM (symbol for positional DF bearing), QDR, and direction finding devices available. This system was also being used by the passenger planes. To improve the security, special air roads were established and equipped with DF stations, meteorological stations, and emergency landing fields. Very important air lines around Moscow were already provided with ultra short wave guide beam channels. The ZZ system (instrument landing system) was not known to the Soviets. The Tu-70 and the Il-18 were fitted with astro domes; astro navigation, however, was not installed. The average pilot flew with ground visibility, preferably along roads and railroad lines.

29. In 1947 the chief navigator of the LII Institute was ordered to work out instructions for the units on the use of the German Knemeyer type navigation computors (Dreiecksrechner System Knemeyer) and German astro computors of the Knemeyer type. 25X1 25X1 [redacted] There were perfect astro and radio navigation directives regarding polar flights. The excellent map material of the polar regions also covered the coastal areas of the mainland. [redacted] 25X1 25X1 [redacted] these maps were prepared on the basis of aerial photography. A great number of meteorological stations, including drift ice stations which had to be supplied from the air, were entered on these maps. The equipment of these stations was said to be excellent. Source was shown the latest type flying suits made of silk kapron (perlon) fitted with a down lining which, even though permeable to air, were waterproof enough to be utilized as life jackets. Aircraft to be flown in polar regions included the types FW-200, Siebel-204, Tu-4, and GST. It was said that Professor Schmidt (fnu), who had been in the USSR since 1923, was in charge of the entire polar research program. [redacted] 25X1

25X1 [redacted]

<u>Teplyy Stan Airfield</u> (Moscow/Salarevo)

30. The airfield of Teplyy Stan (55-37N, 37-29E) was observed between October 1947 and March 1949. Wings and engines of the aircraft stationed there were exchanged in the hangar by unit personnel. The ordnance shop, the instrument workshop, and other workshops were installed in small earth bunkers, lighted by petroleum and, later, by carbide lamps. Electric lights were not being installed, even though a cable was being laid for experiments with the EF-131 and EF-140. The meteorological station was installed in a small loam house and was operated by one meteorologist who had direct telephone connection to headquarters in Moscow. The fuel dump included half

dug-in tanks, each with a capacity of 20,000 to 50,000 liters, and several hundred barrels each with a capacity of 200 liters.[25]

31. Teplyy Stan airfield was occupied by a fighter unit under the command of Colonel Kommunitchskiy (fnu). Prior to 1949, when the first young pilots were assigned to the unit, all pilots were Heros of the Soviet Union. The tactical designation of the unit was not know. It was subordinate to Major General Vassily Stalin, commander of the fighter units of central USSR. An additional unit, the so-called second group, was probably stationed on an airfield near Mozhaysk (55-37N, 35-50E). This unit was charged with the protection of Moscow and performance at air parades. Starting with the summer of 1948, the unit, previously flying with La-9s, was re-equipped with MIG-15s. This change was completed by March 1949, the unit having an authorized strength of allegedly 90 aircraft, 80 of which alerted for a take-off. The La-9s, still parked in standard formation at the field, were covered with tarpaulins and were flown from time to time. [redacted] 25X1 25X1 Observations made during the take-offs, during the flights, and at the parking areas did not reveal anything regarding the tactical designation of the unit. Flying was done in wedge-shaped formations of nine aircraft each, one formation behind the other. The aircraft usually took off at short intervals in elements of three wedge-shaped formations. During favorable weather, the aircraft took off in wedges of nine. The aircraft assembled cutting off the leader. When firing was practiced, the four aircraft flying at the left closed up to the right wing, so that the formation leader was the first one to approach the target. Firing at ground targets was observed with the aircraft flying in formations of five or six planes. For landing in a formation of nine aircraft, the left wing flew ahead of the unit leader. The aircraft always took off from concrete runways and landed on the turf in fairly dry weather. With 12 American electric ground starter units in operation, eight minutes were required for the unit of 80 aircraft to be aloft after the first plane was started. Prior to March 1949 no night flying 25X1 [redacted] with the MIG-15s. [redacted] 25X1 25X1 25X1. The high degree of alertness and the ample supplies delivered indicated that the unit was of particular importance.

32. The communication equipment for the MIG-15s included ground-to-air voice radios and radio compasses. Neither guide beam installations nor any other instrument landing equipment were available at the field for the unit. [redacted] 25X1 25X1 [redacted] such equipment was available in the USSR, but could not be afforded because of the lack of funds. The flying was directed via radio telephone by the flight commander, or by the flight administration, or from a small radio truck parked at the field. The aircraft were not to take off unless the voice radio equipment was in operation. The unit was capable of flying in formation through a thin layer of clouds at good visibility with the cloud base at 300 meters. Approach was by radio compass. The formation disassembled; the aircraft, directed by a primitive system, curved into the approach lane and landed individually at intervals of 39 to 90 seconds. With scattered clouds it was permitted to land with the cloud base at 200 meters.

33. Summer flying suits were made of some kind of roughened linen, and winter flying suits, which proved extremely impracticable [redacted] were made of 25X1 fur-lined linen. Fighter helmets and oxygen masks were copies of German models. There seemed to be no regulation regarding the use of the oxygen mask, as the pilots took off with and without them. The pilots were equipped with duplications of the old American portable oxygen apparatus. A face-protecting device for the bail out with ejector seat was not known. The parachutes were copies of the Irving type. [redacted] special equipment for bailing out at high altitudes [redacted] 25X1 25X1 25X1 [redacted] was to be copied for mass production. Other equipment of that sort was not observed.

 25X1

25X1

34. [redacted] flying activity when a fresh snow layer of one meter was on the ground. The runway and a taxiway were cleared by a snow plow. The snow walls at the side of the cleared runway and taxiway were marked with fir twigs, so the airfield was very easy to make out from above. The remaining snow layer of about 10 cm was rolled with standard field rolling machines to a layer of about five centimeters. This clearing operation took about 30 hours and was also continued during the night. In warmer weather or during early thawing periods, the runways and taxiways were dusted so as to permit simulated combat flight activities at the field. During the real thawing periods, Teplyy Stan airfield, which had no taxiways and a loamy surface, was unserviceable for three to six weeks due to the condition of the field. Conditions at Borki airfield were much more favorable, because the gravel-like subsoil quickly absorbed the ice water.

35. Landing directives to the pilots were transmitted by panels at the landing T. ┌ ordered the pilot to land right of the runway; ┐ directed him to the left of the runway, and X signified "no landing". A yellow T indicated "no landing for aircraft not stationed at the field". The marks were laid out by the unit flight administration.

Borki Airfield

36. Starting in mid-1949, Borki airfield, located about five kilometers south of Kimry (56-52N, 37-20E), was to be used as a test airfield for the experimental plant.[26] The new airfield measured 1,500 x 2,000 meters and had an east-west runway, 1,200 meters long, covered with steel grids. The runway could easily be extended about another 1,200 meters. The subsoil of the field was gravel. Local flights with MIG-15s were observed in 1949 and 1950. Unconfirmed Soviet statements indicated that some of the MIG-15s were already powered by M-2 engines.[27]

Vnukovo Airfield

37. In 1948 and 1949 the new commercial airfield of Moscow, located in Vnukovo (55-36N, 37-17E), was to be extended to 4.5 kilometers in an east-west direction. A new runway, in approximately the same direction, was to be 3 to 3.2 kilometers long.

Dyatkovo (Dmitrov) Airfield

38. The airfield at Dyatkovo (56-28N, 37-26E) was occupied by a unit equipped with Tu-2s. There were about 200 Il-2s or Il-10s, covered with tarpaulins, parked at the field.

The Soviet Aviation Industry

[redacted] 25X1

39. The Soviets intended to have their fighter units re-equipped with jet aircraft by 1951, and by the end of 1950 about 15,000 to 20,000 MIG-15s were completed. No other type of jet fighter was produced at that time. It was said in 1950 that a Lavochkin type jet fighter with a maximum speed of 1,000 km/h was being designed or tested. [redacted] the 1949 and 25X1
1950 series of the MIG-15 had a maximum speed of 860 km/h to 880 km/h.

25X1 [redacted]

25X1 40. A bomber [redacted], on the basis of sketches [redacted] identified as the Type 27 was being mass produced. This type was observed since about early 1950 in the Podberezhe area. According to statements made by Hero of the Soviet Union Colonel Fedorov, the bomber was designed by Ilyushin and was being quantity-produced in Plant [redacted] in Moscow/Fili and in other plants.[34] The bomber had a maximum speed of 820 km/h to 850 km/h. On a visit to Plant [redacted] in 1947 or 1948, [redacted] the plant was not engaged in mass production, probably because it was being converted for the production of this type of bomber. 25X1 25X1 25X1 25X1

41. There was a heavy bomber of the same category as the EF-150. It was said that this bomber was not in large-scale production, which was probably the reason why the Soviets urged the completion of the EF-150. Engineers of the Tupolev testing team stated that the production of such bombers was chiefly handicapped because of the lack of a suitable plant. These engineers respected American bomber plants, which they know from pictures, [redacted] the production of the Tu-4 was rather primitive and seriously hampered by the lack of space. 25X1

42. Whether or not there was another type of bomber being mass-produced in addition to the Type 27 was questionable. [redacted] a formation of eighteen twin-engine turbojet aircraft, possibly Type 27, with slightly swept-back wings and full-view cockpit. A detailed description could not be given, but the aircraft was definitely not Type 17. At about the same time [redacted] a twin-engine Ilyushin jet bomber, powered by two 2,500 kgp Mikulin engines, was being tested, [redacted] There were small jet aircraft similar to the MIG-9, the Yak-15, and the Type 26 in mass production. The large-scale production of conventional La and Yak fighters and of Tu-2 and Pe-2 bombers was brought to an end in 1947 and 1948. Production of Il-2s and Il-10s was allegedly stopped at about the same time.[28] 25X1 25X1 25X1 25X1

43. The following additional types of aircraft were observed over the Moscow area: Large numbers of Il-12s and a few Li-2s (DC-3) flew in civilian air traffic. Il-18s and Tu-70s were occasionally observed. The GST flying boat, which was said to be still mass-produced in Taganrog, flew on scheduled flights. Aircraft of the types MDR-6, MBR-2, and Pe-8 were never seen. [redacted] A-7 cargo gliders being towed by Li-2s and Tu-2s. G-11 and KZ-20 cargo gliders were not seen. Ju-52s were sometimes observed during 1950. 25X1

44. Jet fighters for aircraft carriers were said to be constructed in Leningrad. [redacted] this fighter once briefly at the LII Institute and remembered the designation XB-2 or another number. Flying boats were also said to be produced in Leningrad. There was no aircraft plant in Kimry. Captive balloons were being constructed in Dolgoprudnaya. The chief plant for aircraft tires was located in Yaroslavl. Double-row radial engines for the La-9 and Il-12, and the duplications of a conventional Rolls-Royce engine were allegedly mass-produced at the aircraft engine plant in Molotov. Jumo-004s, BMW-003s, and, [redacted] also engines of the Jumo-012 type were in large-scale production in Ufa. Nene and Derwent engines were mass produced in Leningrad.[29] 25X1 25X1

45. [redacted] the Soviet method of storing aircraft consisted of the preserving and the covering with tarpaulins of aircraft parked outdoors. Additional measures were not required. Stocks of old engines were partially given to the satellites, particularly to Poland and China. The remaining stocks were used for training purposes. Units equipped with MIG-15s did not fly the jet aircraft often after their pilots were retrained, but rather flew older types of aircraft for their routine flying practice. [redacted] flying with MIG-15s was curtailed 25X1 25X1

because of the shortage of turbojet engines, of the bottlenecks in the production of blades, and because of the shortage of fuel. He was inclined to believe that there was a shortage of fuel, rather than that large quantities of fuel were being stocked.[30]

The Podberezhe Area

Radar Station

46. There was a radar station on top of the operational building on the lock of the Volga dam. This station was equipped with a horizontally turning grid antenna, six meters long, fitted with dipoles. Various radar sets with rigged basket reflector were also there. Li-2 and Tu-4 aircraft generally represented the targets. 25X1 [redacted] the instrument was directed at gun boats of the Volga flotilla and at sailing yachts on the Volga reservoir. The yachts were communicating with the radar station via voice radio and practiced measuring the field intensity. [redacted] the radar station was part of the Moscow air defense system and for the protection of the reservoir located in the north. It was also possible that a radar school or a testing station was located there.[31] 25X1

New Plant

47. A new plant was under construction on the Volga River near the reservoir. The construction site extended about 1,500 meters along the Volga and was about 1,000 meters wide. The work was done rapidly and wooden ramps were constructed on the bank of the river, the railroad line to Dmitrov was put into operation again and extended into the plant area. The road to Dmitrov was also extended into the plant area. Former SS members and about 4,500 German women worked on the construction of the plant, the road, and the railroad line. The construction of the plant was started in May 1948 with a work force of about 22,000 laborers, and by May 1949, two eight- to eleven-story plant buildings were completed and in operation. Rumors indicated that the plant was producing guided missiles.[32]

Partisans

48. Groups of partisans appeared in the Podberezhe area, but not as often as in the Ukraine. 25X1 [redacted] frequent alarms because of these partisans.

Tula Sickness

49. During 1948 people in the Kimry area were striken by a sickness causing fever and a loss of weight. It was called the Tula sickness by the Germans, being merely a translation from the Russian. [redacted] 25X1 25X1 [redacted] the Soviets made experiments, dropping mice from aircraft flying at altitudes up to 3,500 meters without doing any harm to the mice. In case of war, mice were to be infected with cholera and typhoid. 25X1 [redacted]

Summary

50. Being aware of the fact that they were behind in the field of technical developments, the Soviets attempted to compete by large-scale production. All their hopes to create a modern and superior air force were concentrated on the development of jet engines. Development and testing methods appeared rather primitive, and the work procedure of Soviet engineers was not systematized . New projects were started with much effort, but the prescribed system was soon neglected, and the project was started anew in a different

way. As there were no exact testing records being kept, much time and effort was wasted until the result could finally be achieved. It is characteristic of the Soviet mentality that they learn fast, but are not persistent enough to get fully familiar with a problem. This was the reason for the failure of many engineers at OKB I. However, in the field of duplicating foreign models, the Soviets were extremely skillful. At the LII Institute [redacted] 25X1 Soviets working on the reproduction of the B-29 [redacted] the shrewd 25X1 and systematic manner in which these activities were performed. The constant shortage of funds seriously hampered all processes considerably. It was not clear whether these funds were actually available. The funds for each project were reduced in order to prevent embezzlements; hence, shortages of all sorts of material occurred daily. One project which was carefully calculated by the German experts and necessitated an expenditure of 150 millions rubles was reduced to 45 millions rubles after it was checked by all Soviet offices concerned. It took weeks to convince the Soviets that 150 millions would actually be required for the project. It was not determined whether the many bottlenecks were caused by shortages or by embezzlements and misplanning. These critical conditions, being more of a general nature, were immediately eliminated as soon as any higher government personalities became interested and used their influence to further the projects. All difficulties were then overcome, and within a short time, the Soviet engineers attained a high degree of efficiency. These conditions were characterized by the statement of a very capable engineer of OKB I who, being asked why he did not become chief manager at a plant, answered: "In the USSR the first director assigned to a plant has to start with nothing and, since he cannot fulfill the high production quota, he will be replaced. The second director who can point out the critical conditions under his predecessor is able to fill about 50 percent of the quota. The third director can fill about 95 percent of the requested output, but he has to go, because the fourth director finally has all the required authorizations from the government and is really able to run the plant. Therefore, it does not pay to become plant director at a new plant, unless four or five managers had previously been assigned to this job".

25X1 [redacted] Comments.

1. During the war Major General M.M. Lukin was director of Aircraft Engine Plant
25X1 [redacted] in Kazan.

2. This tends to confirm LII as designation for the experimental institute which was previously referred to by the names of LOI, LY, and LIE, and which was reported as the test stand for rocket power plants of Plant [redacted] in Moscow- 25X1
25X1 Khimki. [redacted]

3. See Attachment No. 12 for a chart of the probable organization of the Soviet Aviation Industry.

4. This is contradictory to previous information indicating that aircraft models were constructed at the TsAGI Institute.

5. See Attachment No. 1 for an organizational chart of the Soviet Aviation Industry. See Attachment No. 2 for an organizational chart of OPN 1. See Attachment No. 3 for a list of personnel working at OPN 1.

6. Baade probably reported to Marshal Bulganin who, being a member of the Politburo, had his office in the Kremlin.

7. The following construction bureaus are known by their location: Construction bureau Polikarpov, located in Plant [redacted] in Moscow, southwest of the central 25X1
25X1 airport, [redacted] Construction office Kostyakov, for rocket engines,
25X1 located in Plant [redacted] in Moscow. Construction office Yakovlev, located in

25X1 Plant [redacted] in Moscow, northeast of Leningrad road, about 1.5 kilometers northwest of the Frunze administrative building. Construction office Mikoyan - Gurevich, located in Plant [redacted] in Moscow, opposite MAI, near 25X1 the central airport. Construction office Tupolev, located in Plant [redacted] 25X1 in Moscow, between Yausa River and Radio Street, in the same area as the TsAGI Institute. Construction office Ilyushin, located in Plant No 240 at the northeastern side of the Leningrad Road, opposite of the central airport administrative building. Construction office Lavochkin, located in Plant [redacted] in 25X1 Gorki.

25X1 8. This confirms various [redacted] information indicating that four-engine jet bombers were observed at various places during 1948. If correct, the present information indicates that the four-engine Ilyushin bomber probably never went into mass production.

9. The EF-126 Lilly was a further development of a piloted V-1 constructed at Dessau. Merely a dummy of this missile was completed by 1945, and a wooden model was constructed in Dessau under Soviet supervision. After several successful test flights, the aircraft crashed during a spot landing, and the pilot, Mathies, was killed. The improved version of the Argus-Schmidt pulse jet unit Jumo-226 had a thrust of 500 kg.

10. The EF-132 was probably related to the EF-125, a Junkers design. A wooden model was tested in the wind tunnels in 1945. It is believed that the Soviet model was a rather close copy of the German original, as the wind tunnel in Dessau was completely destroyed and the development could be continued only on the basis of the exact data available. The EF-125 was designed as a long-range plane fitted with two turbojet engines at the side of the fuselage and a pressurized cabin.

11. See Attachment No. 4 for a sketch of experimental model No 1 of the EF-131. [redacted] 25X1

12. The theoretical range of 2,400 km is doubted. The maximum wing load at a take-off weight of 27,200 kg was 500 kg/sqm.

13. The center of gravity of 16 to 29 percent would have guaranteed a good stability of the lateral axis.

14. See Attachment No. 6 for a sketch of the EF-140.

15. During the war the Soviets had no tracer ammunition for their larger caliber aerial guns, and 7.6 mm Shkass MGs firing tracer ammunition were mounted on the large guns for target adjustment.

16. The M-2 is probably a Mikulin copy of the Jumo-012. This might explain previous information, according to which the Jumo-012 project was no longer worked on since the summer of 1948.

17. This confirms the output data previously reported for the engines, but contradicts the assumption of a previous report that the EF-150 was to be powered by Soviet versions of the Jumo-022 turboprop engine; [redacted] 25X1

18. There are discrepancies with regard to the height of the aircraft which, according to the present report, is 8 to 8.5 meters. In previous reports it was given as 7.5 meters. See Attachment No. 6 for a sketch of the stick control of the EF-150. See Attachment No. 7 for a reproduction of the EF-150 instrument board. See Attachment No. 8 for a sketch of the EF-150.

19. Boris von Schlippe is known as an expert in fire prevention. He was deported to the USSR in that capacity.

20. It is doubted that this Soviet version of the V-1 should have been powered by two 180 kgp pulse jet units. Another Soviet version of the pulse jet had a thrust of 500 kg. Since this unit has probably failed, the Soviets might have chosen two standard pulse jet units with a thrust of 300 kg each.

21. D 16 T is presumably similar to the American aluminum alloy 24 S. The T probably stands for the Russian word tvërdyy (hard). It is possible that the Soviet chromium-nickel and chromium-nickel-molybdenum steel alloys 30 X H 3 A (30 Kh N ZA) and 40 X H M A (40 Kh N M A) are concerned.

22. This again indicates that the Soviets are working on ceramic turbine blades. It is assumed, however, that only steel alloy blades are still being manufactured in large scale.

23. See Attachment No. 9 for a location sketch of the TsAGI and LII Institutes.

24. These cargo gliders are probably Type 24.

25. See Attachment No. 10 for a sketch of the Teplyy Stan airfield (Moscow/Salarevo).

26. Borki airfield (52-27N, 39-10E) is located near Lipetsk, north of Voronezh. Since the airfield of Kletina, about five kilometers south of Kimry, is located near the village Gorkiy, it is believed that source mistook Gorkiy for Borki. See Attachment No. 11 for a location sketch of the airfield located south of Kimry.

27. The MIG-15 is known to be equipped with two types of engines, a Soviet-built Nene with a thrust of 5,000 lbs and an improved version of the Soviet Nene copy with a thrust of 6,000 lbs. Nene engines have radial flow compressors, while M-2s are axial flow engines. It is assumed that the improved version of the Soviet Nene is referred to, as both engines, the improved version of the Nene and the M-2, have a static thrust of about 6,000 lbs.

28. The information corresponds with conclusions drawn from various PWs' information, according to which the mass production of conventional fighter and ground attack aircraft ended in 1948. Large-scale production of swept back fighters and Type 27 aircraft was started in early 1949. The construction of various prototypes was also stopped in late 1948.

29. Possibly the M-2, because this engine was probably developed on the basis of the Jumo-012.

30. The reference to storage methods for aircraft is probably true. The shortage of jet engines, etc., as reason for the reduction flight hours is also believable; however, it is pointed out that the Soviets tend to cut down the flight hours of their combat aircraft in war and peace.

31. This station is believed to be a sky observation set for experimental purposes or for local air defense. A radar school or testing institute are not known at the reported location. See Attachment No. 11 for a location sketch of the radar station.

32. For a location sketch of this plant see Attachment No. 11.

25X1 33. Comment: According to previous information, the EF-137 was a single pulsejet without a pilot. The total weight of the airframe was 150 kg. The plane was reported to have a maximum speed of 1,000 km/hr and a ceiling of 15 km.

 25X1

25X1 34. [redacted] Comment: Type 27 has been identified as the IL-28.

25X1 35. [redacted] Comment: A similar statement on the reported cancellation of Tu-4 production was made [redacted] These statements are considered to be false; however, they may indicate that the production of Tu-4s was temporarily interrupted. 25X1

25X1 36. [redacted] Not identified. Probably should be spelled Bachta.

Attachments: 12

1. Organizational setup of Opytnyy Zavod No. 1.
2. Organizational setup of the group of chief constructors at Zavod No. 1.
3. List of personalities at Zavod No. 1.
4. Sketch of experimental model No. 1 of the EF-131.
5. Sketch of construction model No. 1 of the EF-140.
6. Sketch of the control stick of the EF-150.
7. Sketch of the instrument panel of the EF-150.
8. Sketch of construction model No. 1 of the EF-150.
9. Location sketch of the TsAGI and LII institutes.
10. Location and layout sketch of Moscow/Salarevo (Teplyy Stan) airfield.
11. Location and layout sketch of a new plant under construction.
12. Sketch of the partial organizational setup of the Soviet aviation industry.

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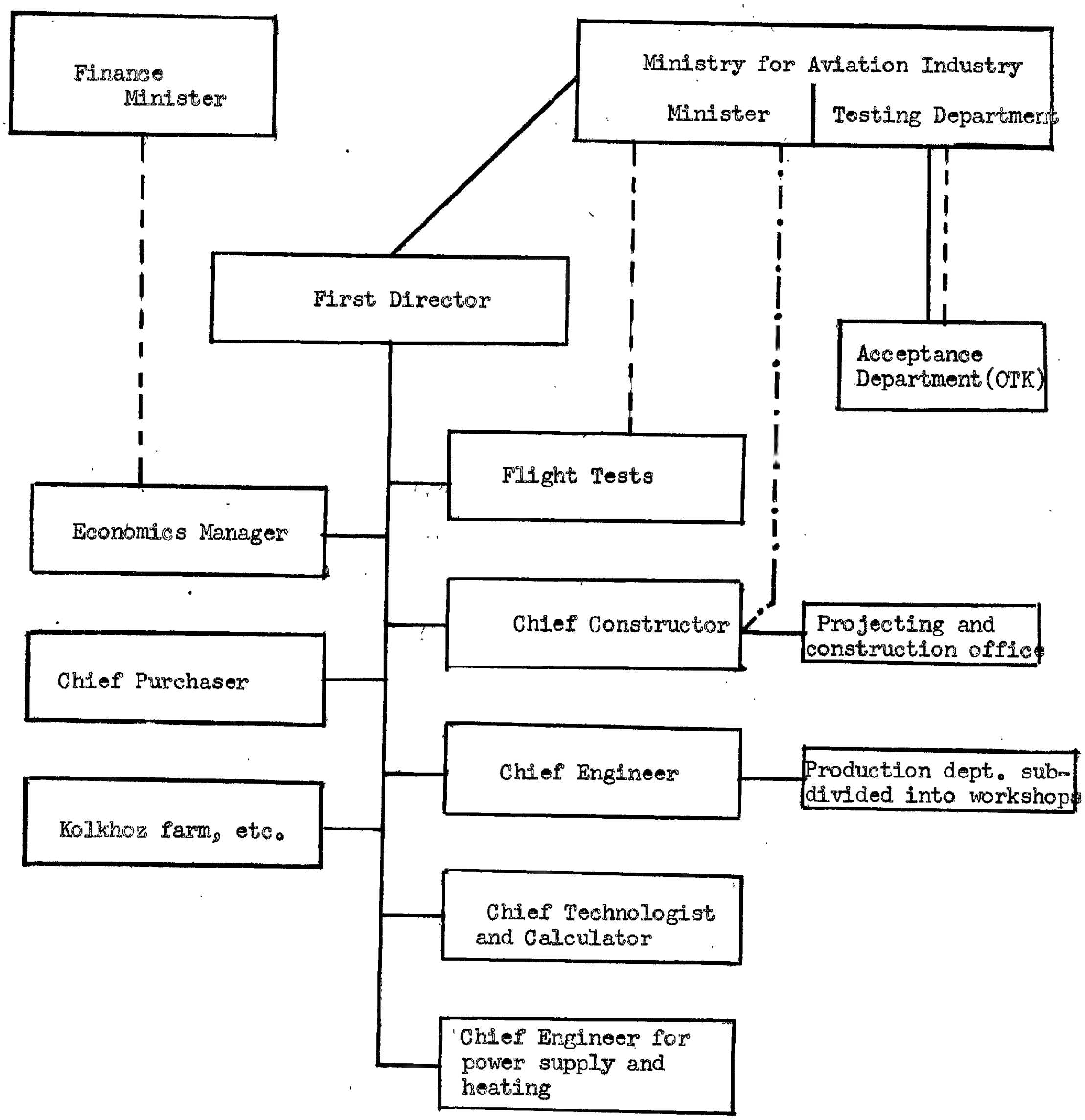
Attachment 1

Organizational Setup of Opytnyy Zavod No. 1



Under the control of

Under the technical control of

Entitled to report directly to

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Attachment 2

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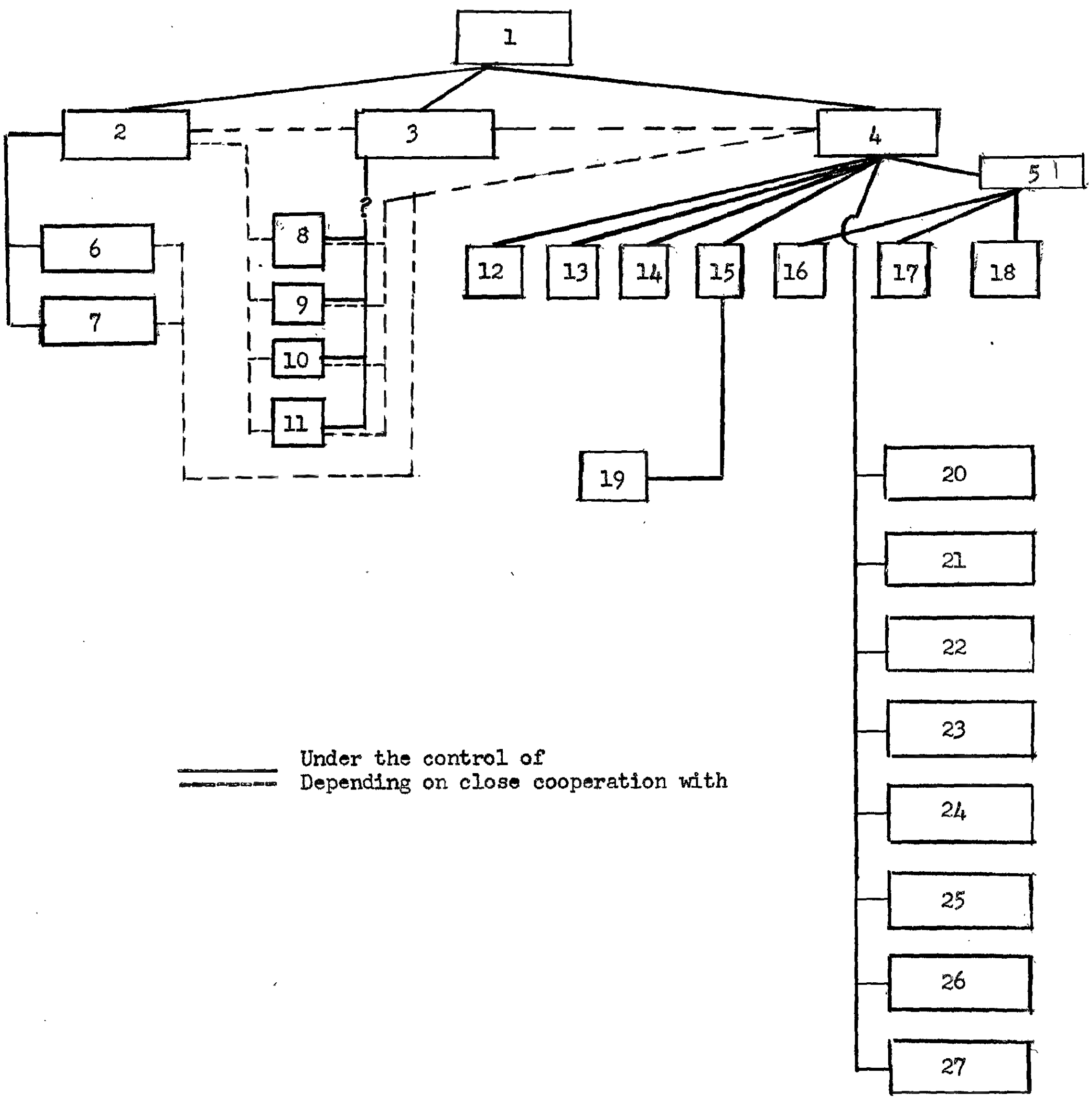
Organizational Setup of the Group of Chief Constructors at Zavod No. 1 in Podberezhe



Under the control of
Depending on close cooperation with

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Legend for Attachment No. 2:

1. First Director.
2. OKB 2; Chief, Roessing.
3. Central plant laboratory; Chief, Eitner.
4. OKB 1; Chief, B.C. Baade.
5. Office Baade.
6. Chemical department.
7. Group "R" (Rockets).
8. Special office: radio equipment.
9. Measuring techniques.
10. Fire extinguishing department.
11. Breaking point testing department.
12. Main department, statics
13. Main department, fuselage construction.
    Sub-departments: Fuel systems, power plant installation, radio equipment, armament equipment, hydraulic systems, and miscelleanous equipment.
14. Main department for wing construction.
15. Main department for servo equipment, remote controls, and hydraulic equipment.
16. Special office for aerodynamics and flight characteristics.
17. Projecting office.
18. Wind tunnel group.
19. Workshop No. 4: laboratory for hydraulic equipment.
20. Bid section.
21. Translation section.
22. Flutter test section.
23. Technical liaison section.
24. Material procurement.
25. Scaling department.
26. Jig and fixtures construction section.
27. Type guidance.

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[redacted]
Attachment 3

Personnel Working At Zavod No 1 in Ivankovo/Podberezhe**

1. Special Office for Radio and Radar Equipment

Chief: Dr. Wehde (Wede) (fnu)
Soviet assistant: Rabinovich (fnu)
Engineer Mantay (fnu)
Engineer Ernst May
Physicist Kurt Schell
Foreman Lapiralla (fnu)
Foreman Tschappert (fnu)

2. Office for Measuring Techniques

Chief: Graduate Engineer Arno Geertz
Engineer Karl Gerasch *
Engineer Kraemer (fnu)
Foreman Karl Leonhardt *

3. Central Plant Laboratory

Chief: Graduate Engineer Heinz Eitner
Engineer Ernst Haeberle *
Graduate Engineer Kurt Maedebach *
Engineer Thiele (fnu) *
Engineer Askar Klein
Miss Anneliese Knoll
Engineer Rolf Schroeder

4. Group R, Rocket Engines

Chief: Chief Engineer Kurt Schell [redacted] 25X1
Graduate Engineer Herbert Ufer
Engineer Richard Stahl
Chief Engineer Fritz Werner
Graduate Engineer Harold Michaelis (also chief of the test stands)

5. Department for Fire Extinguishers

Chief: Graduate Engineer Boris von Schlippe
Graduate Engineer Walter Ballerstedt
Helmut Stegbeck
Aircraft Mechanic Paul Heerling (temporarily in charge of the test stand)

6. Department for Breaking Point Tests

Chief: Graduate Engineer Justus Muttray *
Graduate Engineer Richard Kahofer (theoretical expert for breaking point tests)
Ludwig Hoffmann (also worked in the flight testing group)
Foreman Cassius Johnen (simultaneously chief of the pattern making shop)

7. Chemical Department

Chief: Hubert Emmerich, who was replaced by
Dr. Heinz Dunken
Dr. von Hilpert (fnu)
Dr. Sander (fnu)
Dr. Willi Burmeister
Dr. Phil. Walter Daniel *

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Attachment 3

Dr. Walter Hahn *
Chemist Karl Rudat
Dr. Jahnke (fnu)
Chemist Steffens (fnu)
Gustov Kniestedt
Mechanic Henke (fnu)

8. Otdel Tekhnicheskogo Kontrolya (OTK)
(directly subordinate to the Ministry for Aviation Industry)

Soviet Chief: Filimanchuk (fnu)
Kovrin (fnu)) Soviets
N. V. Vinogradov)
Otto Herzog
Perschk (fnu)
Engineer Otto Richter
Graduate Engineer Erich Werner *

Personnel of OKB I and other Departments with former Junkers Personnel

9. Engineer Baade's Office

Chief of OKB I: Graduate Engineer Brunolf Charley Baade
Deputy: Engineer Fritz Freytag
Assistant: Graduate Engineer Boris Mindach
Master mechanic: Walter Schoenemann
Helga Bohm
Soviet deputy: Engineer N.N. Obrubov

10. Main Department for Fuselage Construction

Chief: Engineer Johann Haseloff
Bonse (fnu) *
Paul Damann
Engineer Hermann Esther
Engineer Foerisch (fnu)
Engineer Heinrich Hadamczyk *
Engineer Hans Leu
Engineer Franz Schubert

11. Subsection for the Installation of Fuel Systems and Engines in Fuselages

Chief: Graduate Engineer Georg Du Bois
Deputy: Max Busse
Soviet deputy: Kondratyev (fnu)
Engineer Walter Haas
Engineer Richard Kuehne
Chief Engineer Weiche (fnu)

12. Subsection for the Installation of Radio Equipment in the Fuselage

Chief: Engineer Otto Nagel
Soviet deputy: Simkin (fnu)
Engineer Wendolin Zindel
Fridolin Rinke
Martin Pansegrau
Engineer Bruno Lehmann
Engineer Alfred Keck
Erich Steeck
Eitel Steeck, brother of Erich

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13. Subsection for the Installation of Guns in Fuselages

Chief: Graduate Engineer Gustav Steuerlein
Deputy: Engineer Franz Gremser
Soviet deputy: Kulavzev (fnu)

14. Subsection for Landing Gears

Chief: Fritz Reuss (his staff was composed of Soviet personnel only)

15. Subsection for Miscellaneous Installations

Chief: Engineer Herbert Scheller
Schmidt (fnu)
Kraemer (fnu)
Engineer Scholz (fnu), installation of photographic equipment

16. Subsection for the Installation of Hydraulic Systems

Chief: Engineer Jakob Antoni
Engineer Ernst Boettger *

17. Main Department for Statics

Chief: Graduate Engineer Waldemar Guenther
Deputy: Graduate Engineer Edward Walzel
Soviet deputy: Feofanov (fnu)

Graduate Engineer Karl Aikele
Engineer Willy Bergmann
Engineer Bernhard (fnu)
Engineer Franz Josef Besinger
Graduate Engineer Kurt Boehme
Engineer Peter Bonin
Engineer Alfred Borgmann
Engineer Siegfried Gottschalk *
Engineer Dietrich Harms
Engineer Hillenbrandt (fnu)
Assistant Master at School Kurt Koeppen *
Engineer Guenther Koscielny
Engineer Otto Mattern *
Engineer Herbert Nebel*
Engineer Fritz Paasch
Graduate Engineer Herman Schmidt-Stiebitz
Graduate Engineer Hans Steinhardt
Engineer Wolff (fnu)
Graduate Engineer Wolff (fnu)
Graduate Engineer Fritz Wolff *

18. Main Department for Wing Construction

Chief: Graduate Engineer Fritz Freundel
Deputy: Engineer Goretzke (fnu)
Engineer Karl Heineck *
Engineer Hermann Kleinschmidt *
Engineer Kramer (fnu)
Graduate Engineer (?) Schreuer (fnu)
Engineer Erich Schurz *
Engineer Franz Strobel
(a total of about 20 persons)

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Attachment 3

19. Main Department for the Construction of Servo and Remote Controls and for Hydraulic Equipment

Chief: Graduate Engineer Erwin Handke, an expert for servo and remote controls
Deputy: Graduate Engineer Johannes (Hans) Mueller, an expert for hydraulic pumps
Graduate Engineer Josef Heisig
Engineer Alfred Wenzlau, and other engineers

20. Workshop 4, Laboratory for Hydraulic Equipment
(works in close cooperation with the main department for hydraulic equipment)

Chief: Graduate Engineer Paul Keller
Deputy: Graduate Engineer Fritz Kramer
Engineer Alfred Bormann
Mechanic Franz Diener
Mechanic Gerhard Heinze
Pilot Fritz Horn
Heinz Albert Kube *
Josef Kunze
Engineer Willi Lehmann
Foreman Meissner (fnu)
Aircraft Mechanic Walter Moses
Engineer Guenther Schroeter
Engineer Rudolf Ulrich
Fritz Tuchel, a precision mechanic

This laboratory also did the target adjustment on the armament of the EF-150.

21. Special Office for Aerodynamics and Flight Characteristics

Chief: Dr. Backhaus (fnu), an expert in the field of aerodynamics
Soviet deputy: Alekseyev (fnu)
Graduate Engineer Hans Kornmueller
Graduate Engineer Walter Lehmann

German deputy: Dr. Engineer Hans Georg Schuhmann, an expert for flight characteristics
Graduate Engineer Hans Mix
Graduate Engineer Martin (fnu)
Graduate Engineer Martin Schrecker
Engineer Walter Schreiber
Busse (Junior) (fnu)
Engineer Edgar Dannecker
Dreusch (fnu)
Engineer Paul Jaensch
Miss Irmgard Riedel
Engineer Walter Ternka *

22. Office of the Chief Projector
(worked in close cooperation with the special office for aerodynamics and with the wind tunnel section.)

Chief: Graduate Engineer Hans Wocke
Deputy: Graduate Engineer Rudolf Renteln
The names of the staff were not remembered.

23. Wind Tunnel Group

Chief: Dr. Engineer Kuno Strauss
Deputy: Graduate Engineer Werner Hempel

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Engineer Hans Dominik
Erich Naumann, foreman for turbojet engines
Graduate Engineer Werner Richter
Engineer Hilmar Stottmeister

24. Section for Flutter Tests

Chief: Graduate Engineer Theo Schmidt
Mathematician Reck (fnu)
Mathematician Siegfried Schilling
Engineer Rolf Wild

25. Group in Charge of Individual Types of Aircraft
An "escorting" engineer from this group was assigned to each type in construction.

Chief: Engineer Erich Wolf
Soviet deputy: Koslov (fnu)
Engineer Jakob Theobald
Engineer Erich Wessel

26. Flight Test Group for OKB I

Chief Pilot: Paul Juelge *
Pilots: Ludwig Hoffmann
Heinz Schreiber

for OKB II

Chief Pilot: Graduate Engineer Hans Motsch, who never flew
Pilots: Karl Treuter
Graduate Engineer Wolfgang Ziese

27. Procurement Section

Chief: Graduate Engineer Lothar Kindler
Soviet deputy: Zava Vlassov
Georg Steib, a draftsman

28. Translation Section

Chief translator: Engineer Bruno Marx
Miss Nelly Heissler
Miss Ingeborg Scheller
Mrs. Xenia von Schlippe *

29. Office in Charge of Technical Connections
This office established connections between the construction offices and the workshops.

Chief: Engineer Heinz Uhl *
Engineer Karl Cottin, probably succeeded Uhl
Engineer Karl Lange
Foreman Erich Richter *
Engineer Fritz Winkler

30. Materials Procurement Section

Chief: Engineer Paul Beyer, died
Engineer Karl Butter [redacted] 25X1
Engineer Werner Lueneburg, [redacted] 25X1

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[redacted] Attachment 3

Miss Edith Nickel
Miss Erika Thiel, who was arrested but then released to Germany

31. Technological Section

Soviet chief: Lasarev (fnu)
Heinrich Barnewald
Engineer Fischer (fnu)
Foreman Erich Koelling
Engineer Erhardt Russeck *
Engineer Theo Walkenbach *

32. Loft Department

Engineer Paul Zimmermann *

33. Department for the Construction of Jigs and Fixtures

Chief: Engineer Gerd Stollberg
Engineer Paul Zuehlke
Naval Engineer Warndt (fnu)
Graduate Engineer Goerasch (fnu)

34. Personnel of OKB I, whose positions are not known.

Albert (fnu)
Wilhelm Grambow
Engineer Grieshaber (fnu) *
Aircraft Mechanic Otto Horn
Engineer Otto Huth *
Engineer Albert Kempf
Graduate Engineer Loesch (fnu)
Willi Markwardt *
Engineer Neffin (fnu) *
Engineer Riedel (fnu)
Willi Riese
Engineer Paul Roehr
Engineer Roessner (fnu)
Foreman Paul Ruschka
Engineer Schumacher (fnu)
Foreman Walter Seidel *
Engineer Anton Steidtle
Engineer Herbert Stephan *
Engineer Paul Szyszka (Zscyska)
Foreman Teichmann (fnu)
Assistant Master at School Josef Wacht
Engineer Ludwig Wagenblas *
Engineer Ernst Westerhellweg
Engineer Ferdinand Wieners *
Engineer Robert Zang *
Engineer Anton Zerressen *

35. Personnel of OKB II, whose positions are not known.

Engineer Helmut Balluff
Erich Boelkau *
Paul Cornelius
Engineer Hellmut Froehlich
Chief Engineer Philipp Graeff *
Graduate Engineer Otto Hauber *

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[redacted]
Attachment 3

Engineer Hauel (fnu) *
Engineer Hans Hellriegel *
Foreman Jahn (fnu)
Engineer Jakob (fnu) *
Engineer Jensen (fnu)
Karsten (fnu)
Fritz Keller
Aircraft Mechanic Heinz Klocke *
Engineer Gerhard Koehn
Engineer Krieger (fnu) *
Foreman Georg Kuenzler *
Graduate Engineer Limbach (fnu)
Graduate Engineer Hans Machill
Engineer Karl Michel
Engineer Herbert Neumann
Engineer Hans Rudolf
Graduate Engineer Erich Siebert *
Engineer Erhard Szucka (Sczuka) *
Engineer Otto Weileb

* Germans who have been released.

** The spelling of the names of the individuals mentioned in this report, and in many cases their position, does not always agree with the information supplied [redacted] 25X1

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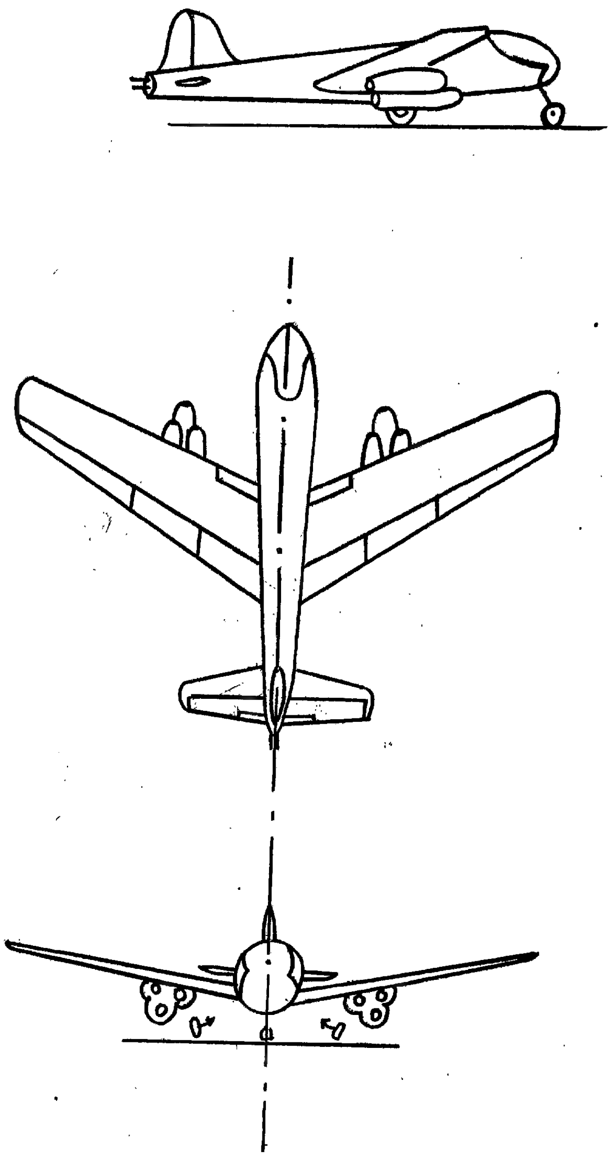
Attachment 4

Experimental Model No. 1 of the EF-131



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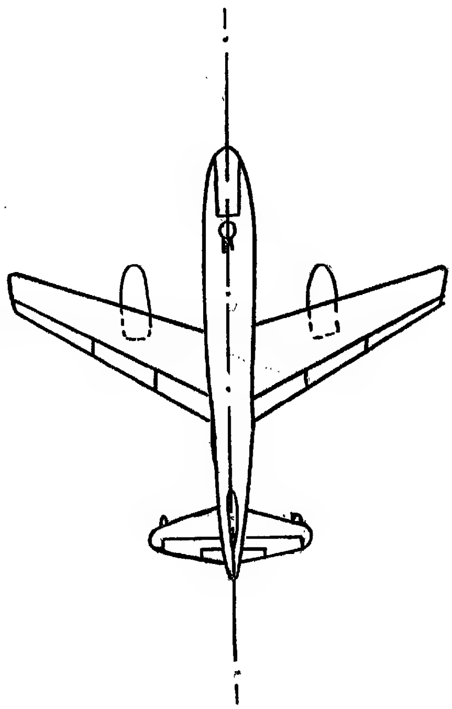
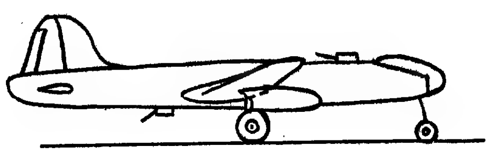
Attachment 5

Construction Model No. 1 of the Soviet Jet Bomber EF-140





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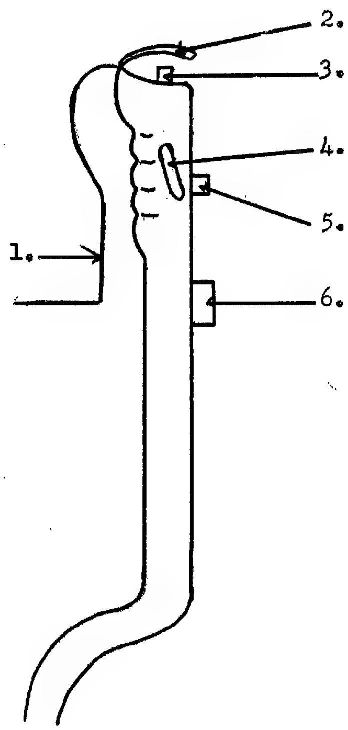
Attachment 6

Control Stick of the EF-150



Legend

1. Wheel brake lever.
2. Safety catch.
3. Firing control.
4. Thumb-operated control for tail plane.
5. Control button for landing gear.
6. Control button for voice radio and tuning device.

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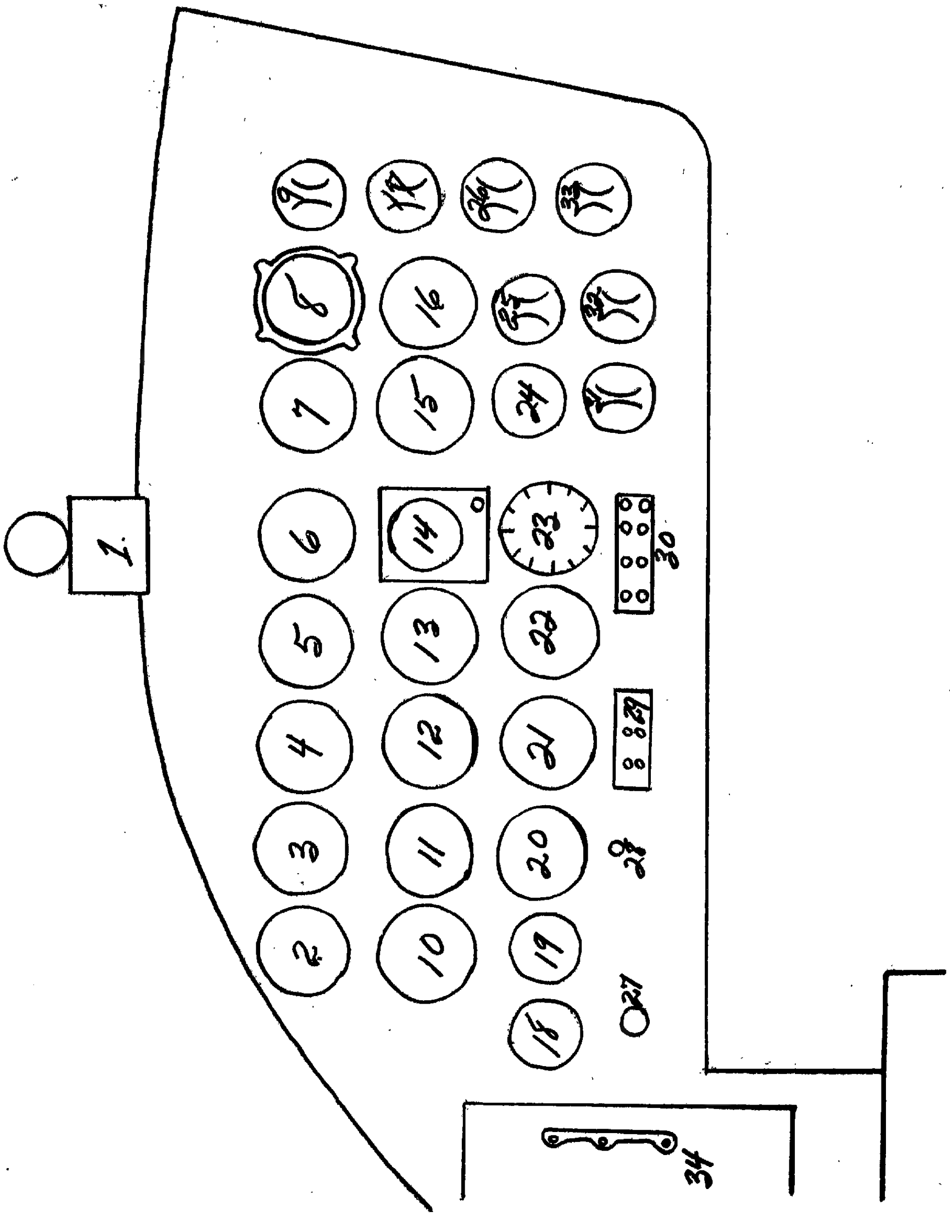
[redacted]
Attachment 7

Instrument Panel of the EF-150



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Legend

1. Reflex sight with rigged cross wires, no computor

2. Mach meter, unusable Soviet make with conversion table

3. Air speed indicator, Soviet copy of a German model

4. Variometer, Soviet copy of a German model

5. Telecompass, Patin system

6. Emergency compass, Soviet model

7. Revolution indicator for left engine, Soviet copy of a German model

8. Revolution indicator for right engine, Soviet copy of a German model

9. Gas pressure indicator, dual device for both engines, Soviet copy of German model

10. Clock with electric heater, type Kirova, Soviet model produced in the Kirov clock factory

11. Turn and bank indicator combined with artificial horizon, Soviet copy of a German model

12. Combined altitude indicator with a thousand-meter scale in window opening, Soviet duplication of a German model

13. Landing sight and glide indicator, Soviet copy of a US instrument

14. Gyro-half-compass, Soviet copy of a US instrument

15-16. Gas temperature indicator for right and left engine, Soviet copy of a German model

17. Indicator for the bearing temperature at both engines, Soviet copy of a German model

18. Automatic controller for the oxygen apparatus, Soviet copy of a German device

19. External temperature indicator, Soviet copy of a German model

20. Electric bank and turn indicator, Soviet copy of a German model

21. Altimeter of type FuG 101, with precision measuring up to 600 meters and rough measuring up to 2,000 meters, Soviet copy of German instrument.

22. Radio compass, Soviet copy of a US model

23. Course indicator with radio direction finder or three-axis control, Soviet copy of a US instrument

24-25. Combined indicators for the kerosene and oil pressure at each engine, Soviet copy of a German model

26. Combined instrument measuring the external pressure and the pressure within the cabin, Soviet copy of a German model

27. Switch for cabin illumination and infra-red illumination for instrument board, Soviet copy of a German instrument

28. Lamp for the de-icing heater

29. Alert switch for Rato units; the starting of the units will be effected by the control stick.

30. Fire extinguisher for automatic operation with thermostats, or for manual operation

31. Indicator for oil temperature at the air intake and exhaust opening

32. Indicator for oil temperature at the air intake and exhaust opening, Soviet copies of German models

33. Indicator for hydraulic pressure of the hydraulic system and the tank, Soviet copy of a German model

34. Auto pilot control; the auto pilot was copied from US models.

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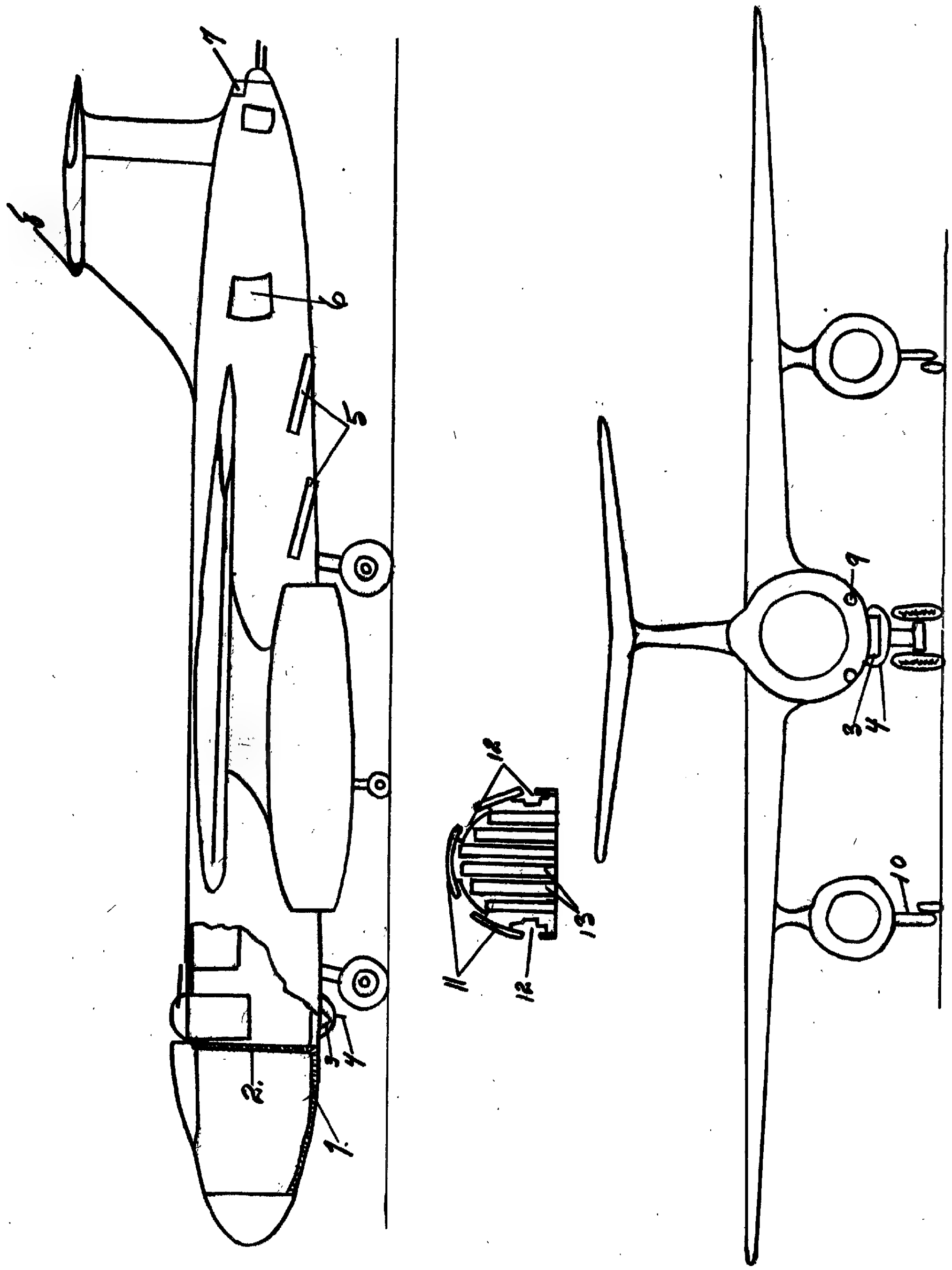
Attachment 8

Construction Model No. 1 of the EF-150



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[redacted] 25X1
Attachment 8

Legend

1. Splinter protection of 10 mm duraluminum plate
2. Armored bulkhead of steel
3. Rotatable antenna of radar landscape scanner
4. Protective cap for rotatable antenna
5. Suspension for Rato units
6. Brake
7. Window for rear gunner
8. Aerodynamic device to decrease vorticity
9. Nose guns
10. Outrigger landing gear turns and folds into engine nacelle

Section of fuel tank

11. Duraluminum plates, 4 mm thick
12. Spars
13. Tubes of duraluminum, 0.4 mm thick, about 8 cm in diameter

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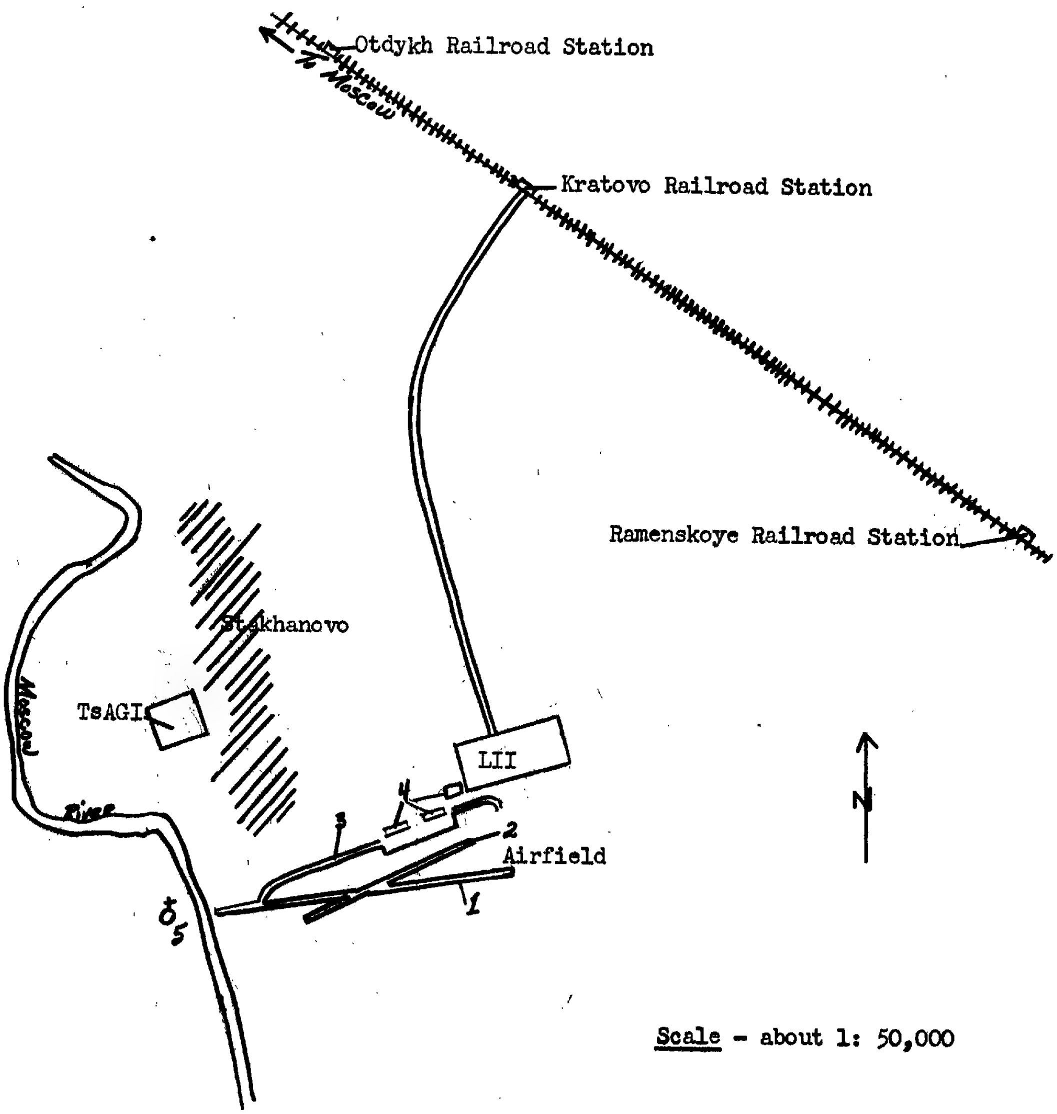
Attachment 9

Location Sketch of the TsAGI and LII Institutes



Scale - about 1: 50,000

Legend:

1. Runway, about 1,000 meters long, being extended to 2,500 m, and 75 m wide.
2. Runway, 1,600 meters long and 60 meters wide.
3. Taxiway.
4. Hangars.
5. Church on a hill.

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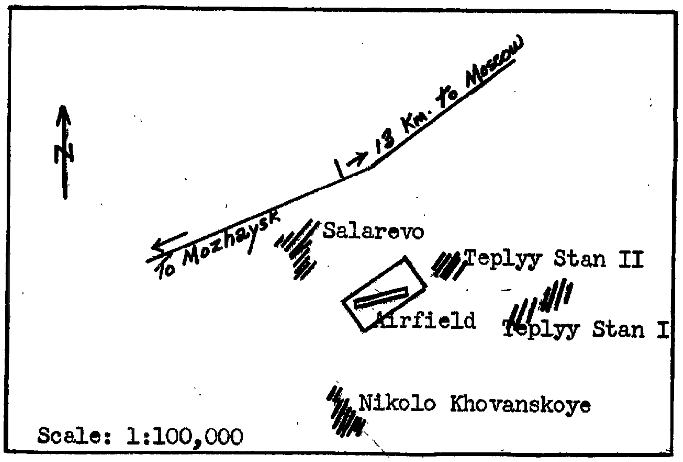
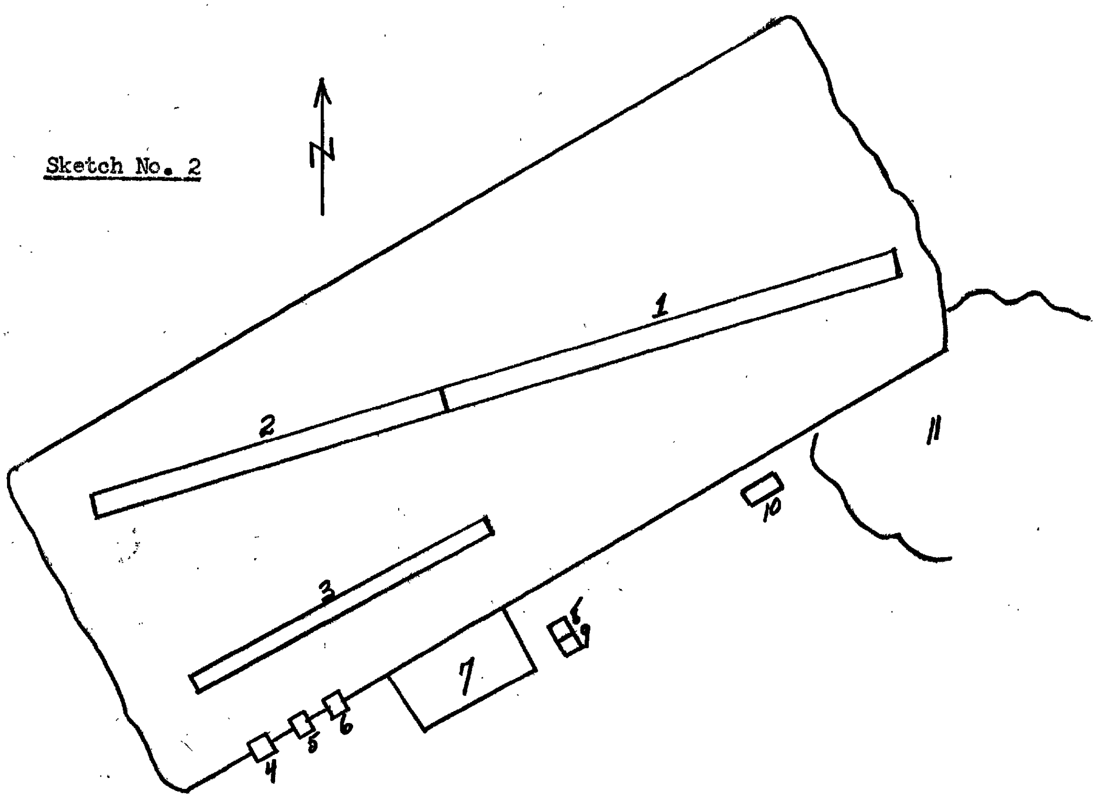
[redacted] 25X1
Attachment 10

Location and Layout Sketch of Moscow/Salarevo (Teplyy Stan) Airfield

Sketch No. 1



Sketch No. 2



Scale: About 1:10,000

25X1

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Attachment 10

Legend to Sketch No. 2

1. Concrete runway, 800 meters long and 45 meters wide.
2. Runway with steel grid surface, 600 meters long
3. Concrete parking area for aircraft.
4. Instrument workshop in a bunker, 5 x 6 meters.
5. Armament workshop in a bunker, 5 x 6 meters.
6. Workshop in a bunker, 5 x 6 meters.
7. Fuel dump.
8. Fire department, 4 x 5 meters.
9. Meterological station, 4 x 5 meters.
10. Hangar, 40 x 60 meters.
11. Collective farm.

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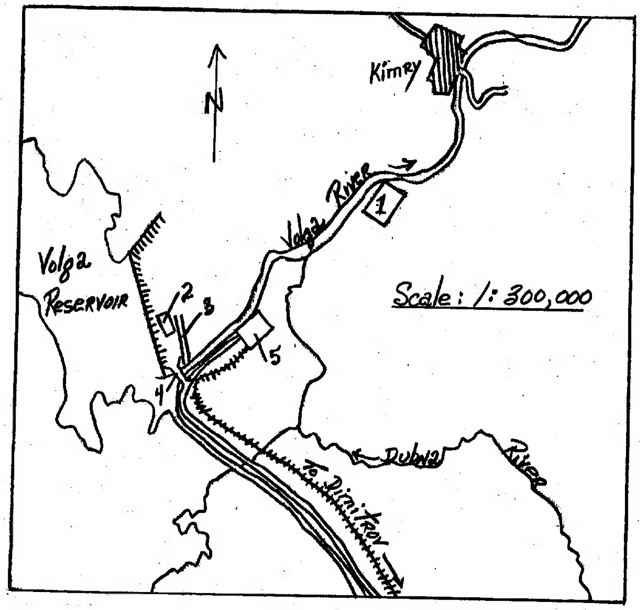
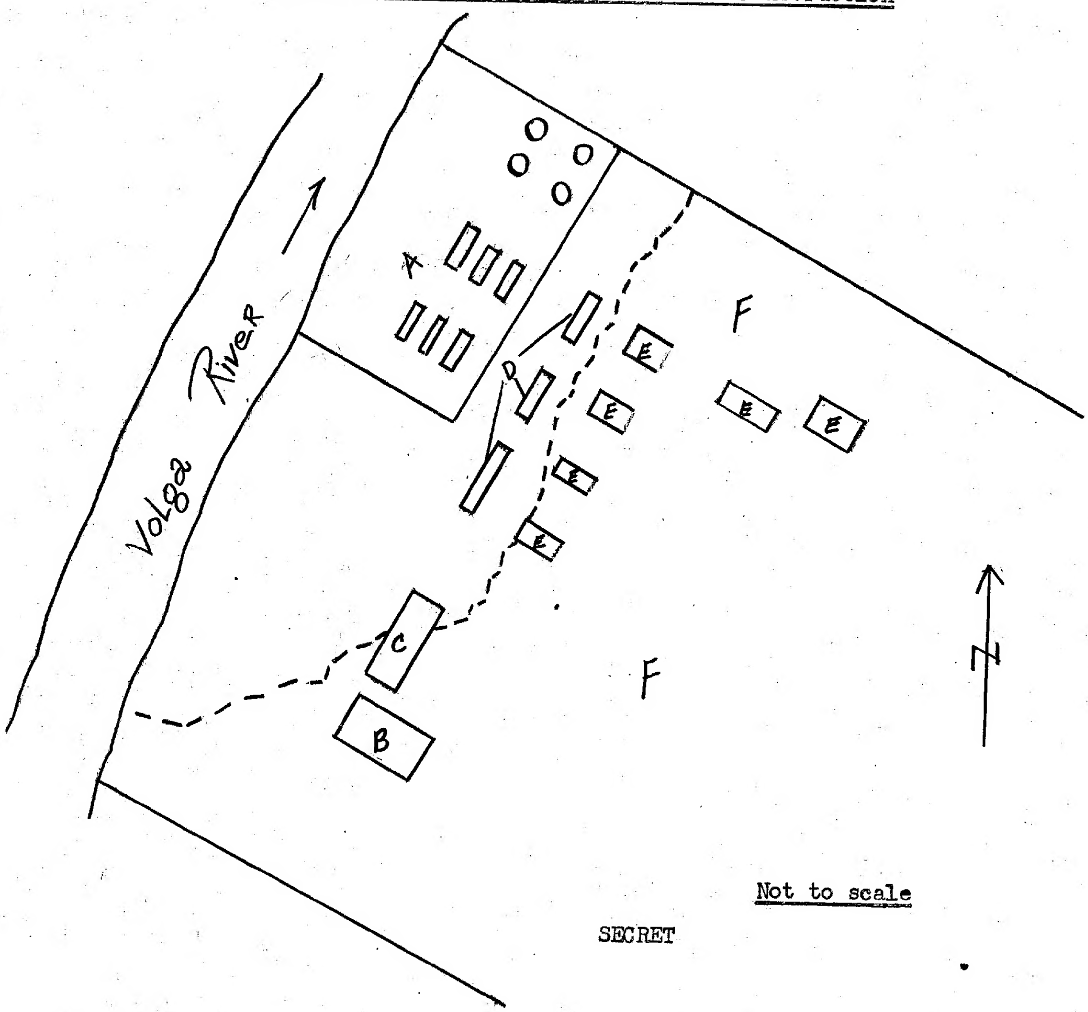
Attachment 11

Location Sketch of OPN I and the New Plant Under Construction



Plant Layout of the New Plant Under Construction



Not to scale

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Attachment 11 25X1

Legend

Sketch A: Location sketch of OPN 1 and the New Plant under construction

1. Airfield

2. Experimental Plant No 1

3. Road with a tunnel under the Volga River and connection to the road to Dmitrov.

4. Lock with radar station

5. New plant under construction

Sketch B: Plant layout of new plant under construction

a. Labor camp, which is surrounded by a fence

b. Twelve-story plant building

c. Eight-to ten-story plant building

d. Labor camp

e. Three-story apartment houses

f. Construction site

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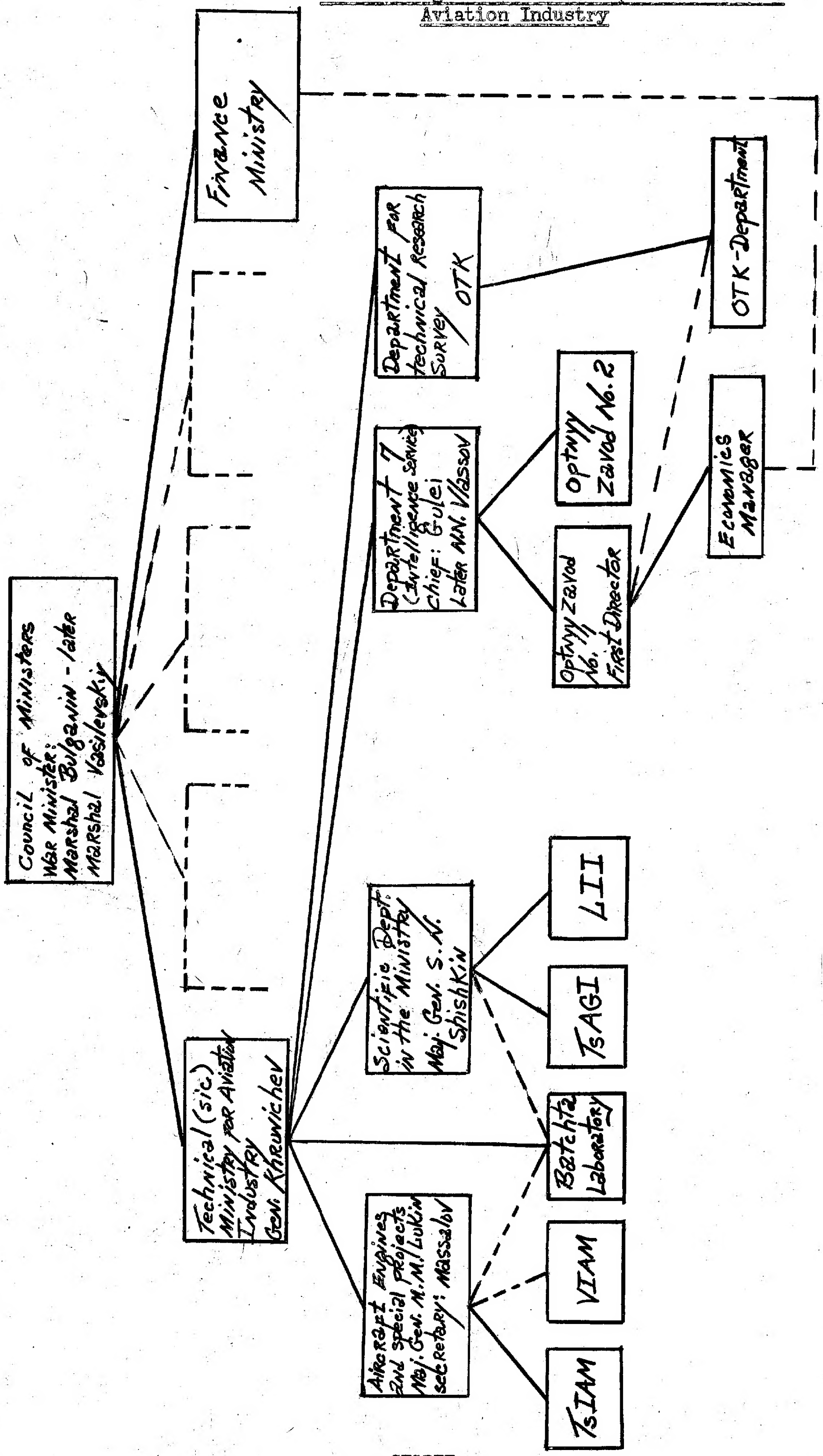
Attachment 12

Partial Organizational Setup of the Soviet Aviation Industry



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